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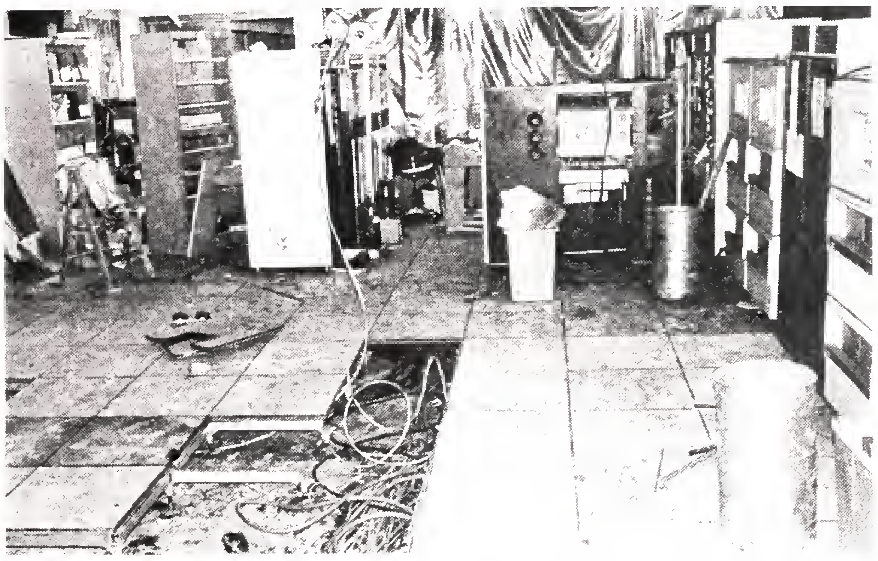
NEWSPAPER



CW Photo by A. Dooley

First Data computer room after partial cleanup with damaged disk drives and charred line printer at right. Polyvinyl wall in background isolates two relatively unaffected Decsystem-10s from charred, sooty debris.

$2 Million in CPUs Damaged As Fire Ravages Installation

By Nancy French

Of the CW Staff

WALTHAM, Mass. – A three-alarm firm of undetermined origin ripped through First Data Corp.'s computer installation here on April 10 and knocked out normal service to most of the time-sharing vendor's 500 customers for at least four days. Some were down almost a week.

Meanwhile, Systematic Data Processing Services, with an IBM 370/155 installed two floors below and across the hall from the site of the fire's origin, sustained only smoke damage. Full operation was restored to this Calldata Systems, Inc. subsidiary by 2 p.m. the next day.

Damage to First Data was estimated at $3.5 million, with about $2 million directly attributed to mainframe destruction. The firm lost all or part of three of its seven large Digital Equipment Corp. Decsystem-10s, several front ends, a dozen disk drives, six tape drives and two line printers as a result of heat and water.

First Data's communications lines, however, were undamaged, according to Dave Frezen, vice-president for engineering and operations.

First Data had been serving its customers on three single-processor Decsystem-1070s, one dual-processor Decsystem-1055 and one dual-processor Decsystem-1077, the firm's president, James Burley, said.

"Saves" of customer disk files completed only hours earlier and awaiting transportation to the company's fail-safe storage area in a nearby building were in the computer room when the fire broke out. However, after reading a random sample of the reels pulled out of the computer room, Frezen indicated more than 90% suffered no damage.

The remaining 10% sustained data losses ranging from one block to an entire file, he said.

Additional backups, made as recently as a week or at most a month before the fire, depending on the backup system customers elected to use, were in the other building, Frezen said.

Data totally lost was limited to that which was input to disk between the close of business Friday and Saturday night at about 9 p.m., when the fire hit.

Mop-Up Operations

Mop-up operations began early Sunday and took all of last week. First Data won't try to repair fire damage to the old

(Continued on Page 4)

Federal Control of EFT Endangers Privacy: OTP

By E. Drake Lundell Jr.

Of the CW Staff

WASHINGTON, D.C. – "Any electronic funds transfer (EFT) system potentially represents a highly effective tool for keeping track of people and enforcing 'correct' behavior," particularly when operated by government agencies, the Office of Telecommunications Policy (OTP) has charged here.

Therefore, present moves to "facilitate the placement of the Federal Reserve System at the heart" of a national EFT system are both "inappropriate and unwise," John Eger, acting director of OTP, said in a recent filing with the Federal Reserve Board (Fed).

This filing and other recent OTP correspondences with interested parties were in response to proposed modification to the Fed's Regulation J. The change would permit the board to act as a national clearinghouse for EFT transactions through its national telecommunications network hooked into a computer switching center in Culpepper, Va.

In the filing with the Fed, Eger noted that "on its simplest level, what has been created [with EFT systems] is the ability to directly interconnect the records which indicate the availability and transferability of funds in an individual's account.

"There is a danger that government operation [of such a system] may ultimately pose very real threats to the privacy of individual citizens. A detailed monitoring of the information carried on such a system could easily generate data on a user's buying habits, political activities, physical movements and so forth," Eger said.

Furthermore, he noted that operation of such a system by the Fed would give it access to at least the entire flow of EFT data throughout the country and "automatic access" to private information.

Critical Issues Ignored

In an earlier letter on the matter to Vice-President Nelson D. Rockefeller, Eger charged the government was going ahead with plans for a national system although "critical noneconomic issues have not been addressed such as the desirability of unfettered government access to personal records either as a user or as an operator of an EFT system.

"Even though such basic questions continue unanswered and often unasked, several federal agencies have moved ahead creating a federal role in EFT operation," he said.

The Federal Home Loan Bank Board, the Federal Reserve Board and the De-

(Continued on Page 6)

IBM Price Control Seen as 'Absolute'

By Edith Holmes

Of the CW Staff

NEW YORK – IBM's price control in the computer field "has been sufficiently absolute to render unnecessary direct management involvement in its means."

That statement – by a high IBM executive – was finally introduced into evidence here last week in the U.S. government's antitrust case against IBM after four years of legal wrangling and almost seven years after it was made.

The statement came from a memorandum written by Hilary A. Faw, IBM assistant treasurer and director of business practices.

The memo outlined how IBM maintained price control in the computer marketplace. It is seen by several observers as the most damaging evidence against IBM introduced by the government to this point, 11 months after the trial started.

"The viability of IBM's risk lease is dependent on price leadership and price control," Faw wrote in the memorandum allegedly requested by IBM's outside counsel, Cravath, Swain & Moore. "By means of price leadership, IBM has established the value of DP usage," Faw said.

Faw noted in his memo, dated Nov. 21, 1969, that IBM maintained or controlled the value of data processing in several ways.

Among these were the timing of new technological innovations in the marketplace; functional pricing, coordinated management of delivery, support services and inventory; refusal to market surplus used equipment; refusal to discount for age or for quantity of machines, strategic location of functions in various boxes of a system, "solution selling," which involved services rather than selling hardware by itself, and refusal to support the subsequent use of hardware, Faw said.

Unbundling Threatened IBM Control

"Unbundling has created a new threat to IBM's price control by eliminating fixed-price solution selling," the IBM executive stated. He suggested this created "a new focus on hardware, eventually leading to increased *price* competition."

Functional pricing was already under pressure because of the activity of original equipment manufacturers, he said, adding that "unbundling will increase that pressure."

Faw said the equalization of subsequent use of machines would add value to existing third-party inventories.

"Legal problems are emerging as a result of certain practices which are key underpinnings to price control," he stated. Among these he listed IBM's refusal to market used machines and parts, its refusal to sell bills of material and its maintenance parts prices.

"The key underpinnings to our control of price are interrelated and interdependent. One cannot be changed without impacting the others," Faw wrote.

"These interrelationships are not well understood by IBM management," he added.

The IBM executive went on to note that the government's complaint against IBM "specifically covers varying profit margins

(Continued on Page 2)

B7700 Performance Boosted 35%

DETROIT – The enhanced Burroughs Corp. B7700 large-scale systems introduced here last week provide up to 35% greater performance than previously available B7700 models, according to a vendor spokesman.

The B7755, B7765, B7775 and B7785 were designed to replace the B7750, B7760, B7770 and B7780 introduced in 1964. The updated configurations provide I/O, memory and data communications enhancements while retaining the same processor.

The increased performance is said to be due to a faster MOS main memory subsystem, an I/O subsystem which increases data transfer efficiency and a data communications subsystem that incorporates a large independent memory and can function autonomously if there is a CPU failure.

Users of B7700 systems already in the field can add the subsystems to their present configurations and mix the units with previously available subsystems, Burroughs said.

The systems are software-compatible with former B7700 models and all members of the firm's B6700 series, the spokesman noted.

The systems can be compared to IBM 370/158 and 370/168 systems, he added.

The B7700s were designed for multiprocessing applications, on-line network management and large-scale data base

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IBM Saw Unbundling Impacted Image

By Edith Holmes

Of the CW Staff

NEW YORK — When IBM unbundled its prices in 1969, users unbundled their DP budgets, documents presented to the court hearing the U.S. vs. IBM antitrust trial here indicated last week.

IBM's move to separate pricing of services like systems engineering, programming and education from the hardware in its systems unfortunately coincided with a general economic downturn and increased inflation in the U.S. in late 1969 through early 1970, an IBM study of the marketplace published by the company in September 1970 said.

IBM noted that its image of "price for quality" or "value received" no longer held. Users generally viewed unbundling as "a self-serving move for IBM" and couldn't see how it could be intended to benefit them, the preliminary analysis of the marketplace stated.

The corporation gained new, less favorable images in the "new world" of unbundled prices. The study discovered users tending to characterize IBM as a "sell-hardware company" — one that would make quota regardless of whether the user needed the machine — and as having a "mediocre quality of systems engineering" — a service not price-and-quality competitive with the rest of the marketplace.

No longer "at the center of a customer's planning operation" or present at an installation to help solve a user's problems, IBM was not in the best position for dealing with the "disappointment, disapproval and total disillusionment" it encountered from users, the document said.

Users More Cost-Conscious

Unbundling and the economy worked together to make users more aware of their DP costs in general, IBM interviews with several DP executives of user organizations determined. DP was no longer thought of as one entity, but as a capability made up of many parts and, for the first time, users began to budget for those separate parts.

Economy Cited

IBM believed users reacted more strongly than anticipated to unbundling because of the poor economy, according to the document. But, regardless of the reason, IBM's high prices — tolerable when bundled — were not price/performance competitive when the items were judged separately.

Users accordingly established new guidelines for the procurement of DP equipment and services, the study found. The year 1970 saw a definite "slowdown" of the development of data processing capability as users decided they couldn't or wouldn't fund such development.

IBM felt in the long run users would benefit from unbundling by becoming more self-sufficient; part of that self-sufficiency meant turning to other suppliers.

IBM Concerned

User reaction to unbundling was of concern within IBM from its management review committee (MRC) at the top of the organization to the branch offices of the corporation where salespeople came into direct contact with users every day.

As part of its unbundling case, the government put before the court documents from an MRC meeting and from a DP executive's field trip to various branch offices.

In both cases, the suggestion was that IBM could manage its sales force better, providing more technical training to marketing representatives to compensate for the absence of free systems engineering services.

Other documents based on IBM attendance at user group meetings and briefings on unbundling suggested IBM treat all users consistently, pay attention to competitors' complaints with regard to separate pricing, appraise all the services the corporation offered and keep in mind federal antitrust proceedings and General Services Administration procurement policies to avoid conflicts.

IBM Price Control 'Absolute,' Official Says in Trial Document

(Continued from Page 1)

and an intensive investigation of this issue would reveal the extent of our price control and its supporting practices. Such a revelation would not be helpful to our monopoly defense," he said.

"If IBM's price control is seriously threatened, either from the market (because of unbundling) or from legal exposure (because of supporting practices) or from the Department of Justice (because of demands for remedy)," he stated, "it is necessary that IBM management fully understand its import in order to decide" whether to negotiate with the government or to go to court, how to price new systems and whether to reduce the legal risks involved in certain practices.

Accordingly, Faw recommended "a small, knowledgeable, secure group" be assembled "to think through these issues, articulate them and their interrelationships — define the emerging environment and the various new forces which indicate significant change — and map the rudimentary elements of a strategy or alternative strategies for consideration by management."

The government has offered the Faw document to show the effect of unbundling on IBM account control, IBM's ability to control price and exclude competition, the corporation's recognition of barriers to entry, IBM strategy, IBM pricing and profits and the significance of IBM's leasing systems to users.

The Faw memo is one of more than 2,500 documents IBM had fought long and hard to keep out of the case by claiming that all are privileged communications between a client and a lawyer.

Judge Edelstein ruled against those claims in 1972 and levied a stiff fine on the corporation, requiring it to turn the documents over to the Justice Department. IBM has twice appealed the issue to the Supreme Court, but has been turned down on each appeal.

One other document with a claim of privilege attached to it also made its way into evidence last week.

Dated Dec. 30, 1968 and entitled "Business Practices Strategic Task Force: Statements on Objectives, Principles, Concepts and Assumptions," the document also spoke of IBM's awareness of legal pressures and considerations.

"The key objective of the task force is to develop a business plan which will render the corporation legally defensible in its pricing approach to the systems engineering guidance, Type II programs and education services areas," it said. "This objective was unanimously agreed upon."

Correction

The appeal of the Flint, Mich. voting error lawsuit decision has not been denied, as was reported in *Computerworld* April 12. The stay of the election on April 13 was denied by the Michigan State Court of Appeals, but the appeal itself has yet to be ruled on.

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Fire Devastates T/S Firm; $2 Million in CPUs Lost

(Continued from Page 1)

installation until new equipment is delivered and installed in alternate sites and until service is restored to the vendor's customers, Frezen said.

Several of these are large government agencies including the National Institutes of Health and the Interstate Commerce Commission. Another — the Federal Aviation Administration — had been using the network for a large modeling system that helps schedule aircraft arrivals when problems result in landing and takeoff delays, according to Burley.

Technicians from Scopus Corp., a media maintenance organization, went to work the day after the fire, cleaning every inch of magnetic tape and disk surface. By the end of last week, they had cleaned nearly 3,000 reels of magnetic tape with sapphire blades.

About 200 disk packs were opened, checked for warps and scratches and then bathed and brushed clean in small washing machines.

The technicians also cleaned some 5,000 reels and 120 disk packs for Systematic Data.

Soot was so thick on plastic surfaces that only isopropyl alcohol would remove it, the technicians said.

Alternate Service

Alternate service was arranged for all customers' critical needs thanks to excess capacity purchased from First Data's competitor, Computility, and equipment loaned at no charge by DEC, whose personnel "performed magnificently" throughout the crisis, Frezen said.

"When I arrived at 1 a.m. from a weekend trip to Cape Cod, our DEC salesman, Fred Massey, was already there to meet me," Frezen said.

"Sunday afternoon Peter Briggs from DEC's manufacturing group arrived and spent two 12-hour days helping us arrange for new equipment deliveries," he said.

DEC President Ken Olsen was also on the scene Sunday afternoon to lend a hand, and DEC maintenance teams began round-the-clock service the same day.

Biggest Problem

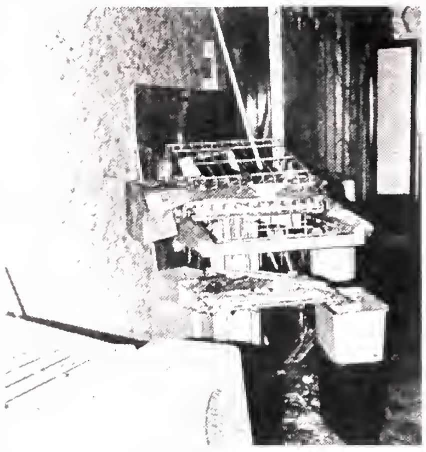
Since the fire broke into First Data through the power riser, the biggest problem with the undamaged equipment was getting power to them, Frezen explained.

"We've been working section by section as soon as electricians could install the new cables," he said.

A roomful of sooty reels await cleaning by Scopus technicians.

By press time, the two shared systems furthest from the fire site and a third system dedicated to the National Institutes of Health had been isolated from the burned out area by a polyvinyl wall and brought up for use.

Customers were assigned to these systems, and the only difference in service they will experience temporarily will be changed dial-up numbers and a more heavily loaded system, Frezen said. Service on these systems was restored last Wednesday.


CW Photos by A. Dooley

Remnants of paper stacker hauled out of debris-filled computer room awaits dumping.

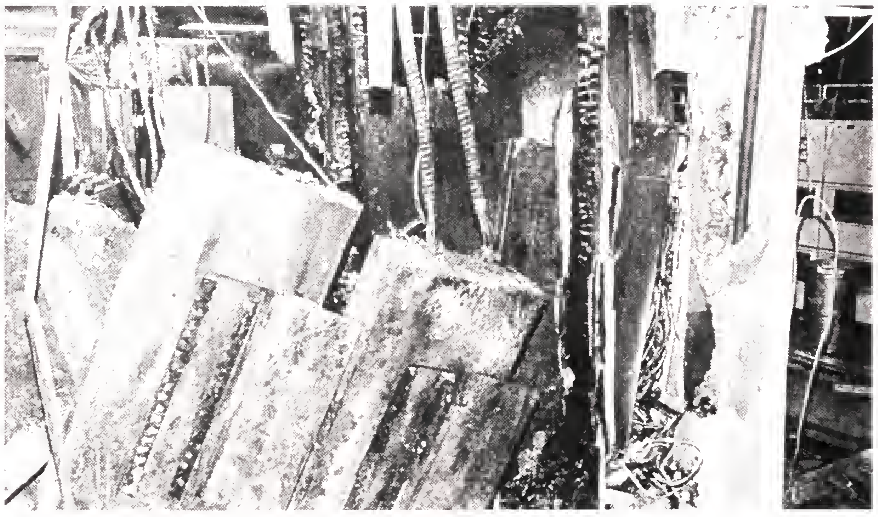
In addition, customers in the Washington, D.C., area were assigned phone numbers to access the system in Marlboro, Mass., loaned by DEC's marketing department.

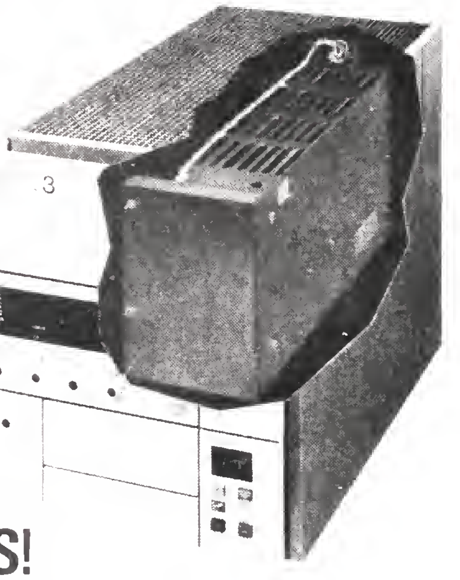
Another nearby computer room, vacated recently by Carling Breweries, was also leased as an installation site for a new Decsystem-1080 delivered last Tuesday. First Data expects to have customers on this system within two weeks, Frezen said.

Originally to have been only a processor, the order was quickly expanded to an entire system by DEC's Briggs, Frezen said.

Delivery of another 1080, scheduled for May, will be accelerated, and a third system due still later will arrive within six weeks, the vendor said.

"Our main problem right now is to find homes for these systems so we can accept delivery," Frezen said.


Remains of circuit breakers and power cables where flames stole into computer room area show most serious damage.



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Seeks $11.2 Million From Honeywell

Suit Says H110 Performance Put User Out of Business

By Molly Upton
Of the CW Staff

NEW YORK – A defunct insurance firm, Triangle Underwriters, Inc., has filed an $11.2 million breach of contract suit against Honeywell, Inc. and Honeywell Information Systems, Inc. (HIS) charging it was put out of business by the incompetent performance of an H110 system.

In its answer, Honeywell denied the allegations, sought dismissal of the Triangle complaint and asked for payment of $5.2 million it claims Triangle owes for maintenance.

Triangle, which had been in business 44 years until 1974, converted from a card-oriented IBM 360/20 to the H110 after assurances from HIS the system would be of a turnkey nature, the complaint said.

HIS told Triangle the system would provide it with internal security and faster processing and eliminate many existing clerical operations, according to the Triangle brief.

In addition, HIS told Triangle the system would save the insurance firm $35,000/year in operational expenses, but Honeywell knew these representations to be false, the brief charged.

The vendor also assured Triangle it would run parallel systems for 90 to 120 days, but this was never done, according to the brief.

The Triangle suit, filed in the U.S. District Court for the Eastern District of N.Y., asked for a trial by jury.

Charging HIS and Honeywell with fraud, misrepresentation, breach of warranty and gross negligence, the suit seeks $5 million for loss of business and future profits, $1.2 million in out-of-pocket expenses and $5 million in exemplary damages.

Honeywell "knew or should have known and therefore was grossly negligent in representing to the plaintiff that its systems and programs were capable of performing and supplying the data required by the plaintiff," the complaint said.

Triangle charged HIS intentionally failed to run adequate parallel systems. HIS also "never properly updated the current daily records so that even had the plaintiff been aware of Honeywell's inadequacies, fraud and misrepresentations, it would not have been able from the very inception to immediately cancel and return the system because it did not have a permanent current system of its own with which it could continue servicing its operation," Triangle said.

Triangle agreed in January 1970 to lease the H110 and eventually converted to a purchase agreement.

Then, in December 1974, the firm went out of business. "It was unable to meet or even ascertain its obligations; had to cease its operations, [and] was forced to turn over its existing business to a competing firm to avoid additional liabilities and obligations, all as a result of being induced to purchase the system and programs devised, installed, prepared and designed by the defendant herein," the brief stated.

Triangle indicated Honeywell made an oral agreement that it would supply a special system to meet Triangle's present and future business needs and that it would be responsible for all installation, implementation and modification and the performance of the system.

Honeywell and HIS denied Triangle's charges and contended that each of the alleged causes of action is barred by the applicable statutes of limitations and frauds of the state of New York and the [illegible] Ma[illegible].

In addition, "[illegible] damages alleged [illegible] in part by the [illegible] negligence or fault of plaintiff [illegible] conduct, plaintiff is barred from [illegible] all damages [illegible] negligence of [illegible]," the reply stated.

In addition, the Honeywell reply indicated Triangle waived any and all indirect, special and/or consequential damages in respect of its purchases of goods and services. It therefore is barred from recovering any alleged damages, Honeywell said.

Regarding warranties, express or implied, Honeywell said Triangle waived all warranties except those that were written.

DP Aiding Research On Noise Barriers

ANDOVER, Mass. – People who live next door to superhighways may someday benefit from a computer-based noise control research project being conducted here by the U.S. Department of Transportation (DOT).

In conjunction with the Cambridge Collaborative, a Boston-based acoustical consulting company, the DOT Transportation Systems Center is using a 1,000-foot-long plywood fence along Interstate Route 93 as a barrier to traffic noise, according to Edward Rickley, project engineer.

Using 14 microphones in various positions along and behind the fence as well as in a nearby field, DOT is measuring noise levels at various times of the day and night as well as under different weather conditions and in different seasons.

Noise levels received by the microphones are transmitted to DOT's modified General Radio 1921 real-time analysis system where they are digitized. The digitized data is then fed through a Wang 720 computer with 2K internal memory and 8K of add-on memory. The data is then stored on 614K-byte disks.

Correction

The figure skating scoring program developed by Al Beard for the U.S. Figure Skating Association [CW, Feb. 16], was not the system used during the Olympic Winter Games.

The Olympics' program, which ran on dual Honeywell 61/60 systems, was prepared by Honeywell Bull Austria.

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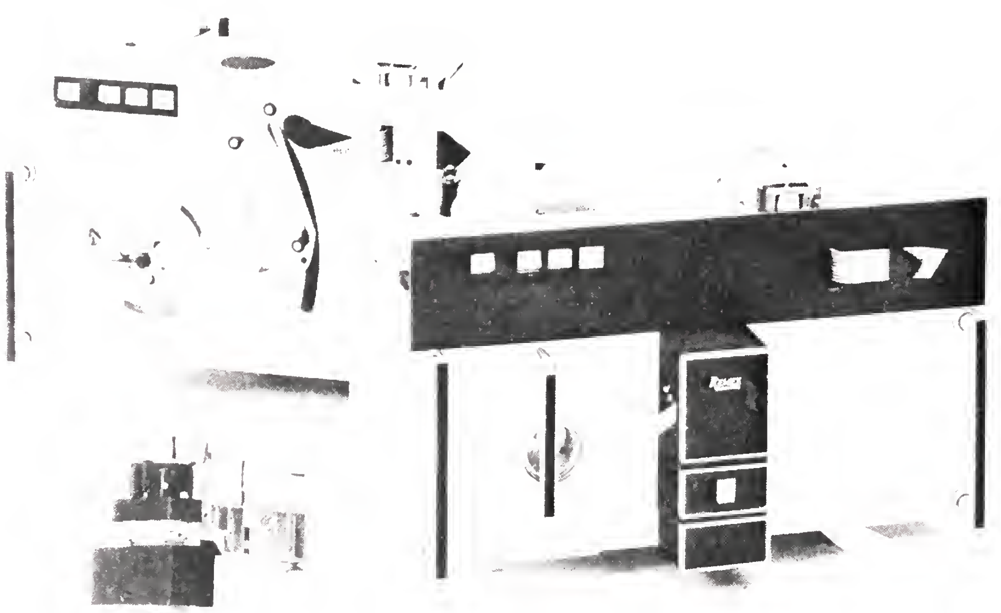

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U.S. Control of EFT Endangers Privacy Of Individuals: OTP

(Continued from Page 1)

partment of Treasury have "all taken steps which move us closer to Federal operation and control of an EFT system.

"Yet the proper federal role is still an open question; perhaps most importantly it is a question of such far-reaching consequence it should be addressed and resolved at the highest possbile level and in the broadest possible form," he added.

At the very least, "it is not a question that should be left in the hands of a small number of agencies" which might not represent all interests, Eger said.

Noting that the National Commission on EFT had just started activity, Eger said it could not be relied on to resolve the issues since the private sector was "moving ahead rapidly" with implementation of such systems. Someone has to make a major decision now and not when the commission finally reports, he added.

At present, Eger noted in another recent letter to Benjamin Rosenthal (D-N.Y.), the Department of Treasury desires only to transfer tapes to the Fed's computer center.

The proposed regulations could permit the switch to the use of the Fed's computer/communications system for electronic transfer without further hearings, however, he said.

Furthermore, he noted that while, "as presently envisaged, EFT would relate only to financial transfers. . .there is nothing inherent in EFT systems which limits its uses to these purposes."

Eger told Rosenthal that, while OTP does not object to the use of telecommunications by the government for financial transfers, "management of EFT systems should be left to the private sector."

In addition to the threats to privacy raised by the Fed's proposed operation of such a system, Eger charged that government control would stifle innovation by eliminating competition in the field.

Such government control, Eger said in the filing with the Fed, would "stifle innovation in the use of telecommunications systems" because all competition would be discouraged from entering the marketplace.

Also, there is "no need" for the Fed to "operate the core of the system," since private industry has shown its willingness to develop and operate EFT systems.

Unless there is a compelling economic reason for the Fed to operate the system, it should not, Eger said. Because of the willingness of private efforts in this area there is no overriding need for Fed involvement, he added.

Furthermore, Eger charged that the Fed's justification for getting into the field is "simplistic." The Fed indicated it should be at the heart of a new system just because of its role in clearing paper transactions in the older manual clearing operations, he said.

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Performance of Updated B7700 Models Improved 35%

(Continued from Page 1)

management. The processors have a cycle time of 62.5 nsec and incorporate an integrated 6K-byte, high-speed bipolar memory, the firm said.

The B7700 models introduced were:

- The B7755 with one central processor and one I/O processor.
- The B7765 with two central processors and two I/O processors.
- The B7775 with three central processors and two I/O processors.
- The B7785 with four central processors and two I/O processors.

Prices range from $2.86 million for a B7755 with 1.5M bytes of storage, two card readers, one card punch, three printers, eight tape drives, 1.4G bytes of disk and a head-per-track disk file subsystem to $9.68 million for a B7785 with 6M bytes of memory, four card readers, two punches, seven printers, 24 magnetic tape units, a 5.6G-byte disk pack subsystem and a head-per-track disk file subsystem, Burroughs said.

MOS Memory Subsystem

The memory subsystem introduced includes an MOS memory module and a dual control unit using Burroughs' Current Mode Logic circuits.

The subsystem takes up 60% less floor space than the previously available memory subsystem, the firm said, while reducing power consumption by 50%.

Memory speed has been increased to 78 nsec/byte from the previous core's 88 nsec/byte through four-word memory phasing and interleaving to each memory storage unit, the spokesman said. The system can include up to 6M bytes of memory.

The I/O processor has been enhanced to provide four-word buffers instead of the single-word buffer for the previous I/O module and a two-word buffer on the older I/O processor that handled disk.

Each of the I/O processor's 28 data channels have the 24 bytes of buffering, Burroughs said.

A feature dubbed the Throughput Scheduler enables the I/O subsystem to keep track of the amount of data passing through at any given time, preventing the B7700 system from exceeding the level of activity it can handle, the spokesman said.

Burroughs has increased the independent memory on its data communications subsystem to 393K bytes compared with 96K bytes on the older system, he added.

A data communications control capability enables the system to have network continuation should the CPU go down. The data is placed in the subsystem's local memory and may be then stored on disk, he explained.

A broadband communications capability allows the data communications processor (DCP) to service multiple high-speed data links that range from 19.2 kbit/sec to 1.3M bit/sec, Burroughs said.

The broadband line operates asynchronously with the DCP and communicates at the message level through binary synchronous or Burroughs Data Link Control procedures, the firm continued.

Another [illegible] introduced [illegible] message-oriented [illegible] mation from [illegible] storage for [illegible] programs," the [illegible]

The B7700 [illegible] eight DCPs which [illegible] 2,048 lines, Burroughs [illegible]

The head-per-track [illegible] can store up to [illegible] subsystem that can store up to [illegible] bytes announced with the B2800, [illegible] and B4800 systems can be used [illegible] enhanced B7700, Burroughs added.

The B7700s can be programmed in Cobol, Algol, Fortran, PL/I and Basic as well as interactive APL, Burroughs said.

The systems are scheduled for delivery in the first quarter of 1977 while the data communications subsystem will be available in the third quarter of 1977, Burroughs said from Detroit, Mich. 48232.

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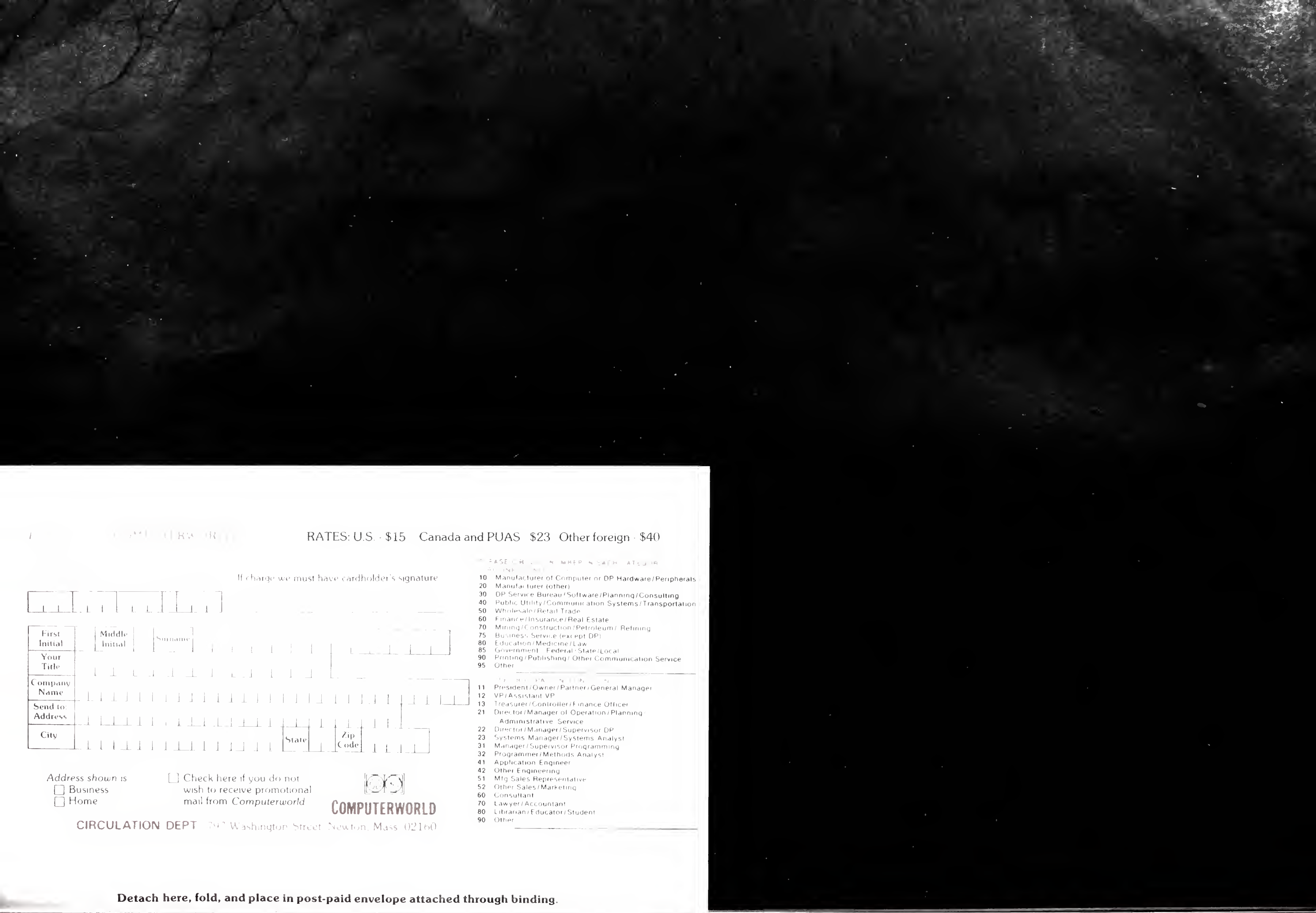

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DP Zip Code Scheme Often Sends Mailings To Exotic Destination

By Nancy French

Of the CW Staff

SEATTLE – Ever wonder what happens to the mail that goes out of a DP shop with the bogus Zip Code 99999?

Postal clerks working at automatic letter-sorting machines sort it for Ketchikan, Alaska – whose Zip Code actually is 99999.

What's more, because Ketchikan mail is "concentrated" here in Seattle for shipment to Alaska, this is where it's ending up – and by the bagful, postal authorities said.

Companies with computer-generated mailing labels often use 99999 if an address contains no Zip Code at all, they explained.

"The problem turned up in a quality control check of Seattle's Alaska mail," according to Frank Wingard, manager of quality control for the Seattle post office.

"At that time we were running about 'two feet' or 1,200 letters a day coded with the bogus 99999 Zip," he said.

Once identified as undeliverable, Seattle postal clerks must stamp each piece and re-sort it for return to the sender, Wingard said, noting the U.S. Postal Service is therefore handling each piece twice for the same 13 cents postage.

Non-Zipped Easier

Although Wingard in no way advocated leaving off the Zip Code, non-Zip Coded mail gets far better handling than the 99999 mail, he indicated.

Mail without a Zip is keyed onto a conveyor belt for hand sorting, which delays delivery about a day under normal circumstances. If mailed over the weekend, it could be delayed as many as five days, but at least it gets delivered, he said.

As for a solution, the Postal Service has published news about the problem in *The Postal Bulletin* and *Memo to Mailers*, he said.

In addition, quality control technicians are keeping track of the mailing firms responsible. The firm's customer service representatives are being asked to contact their customers and ask them to correct the problem.

The only long-term solution is to sort each mailing list for the 99999 Zips and look up the addresses in a Zip Code directory, Wingard said.

Another aspect of the Zip Code problem is the fact that five-digit Zip Codes have caught on, and several European countries have adopted numbers that duplicate those used in the U.S.

Since the clerks operating the automatic sorting equipment look only at the Zip Code to maintain enough speed to make the equipment feasible, they are sorting letters addressed to Paris with a 750 series Zip Code to Dallas, Texas, which is designated by the same series.

Medina, Wash., with a 980 Zip Code series, receives mail addressed to Sicily.

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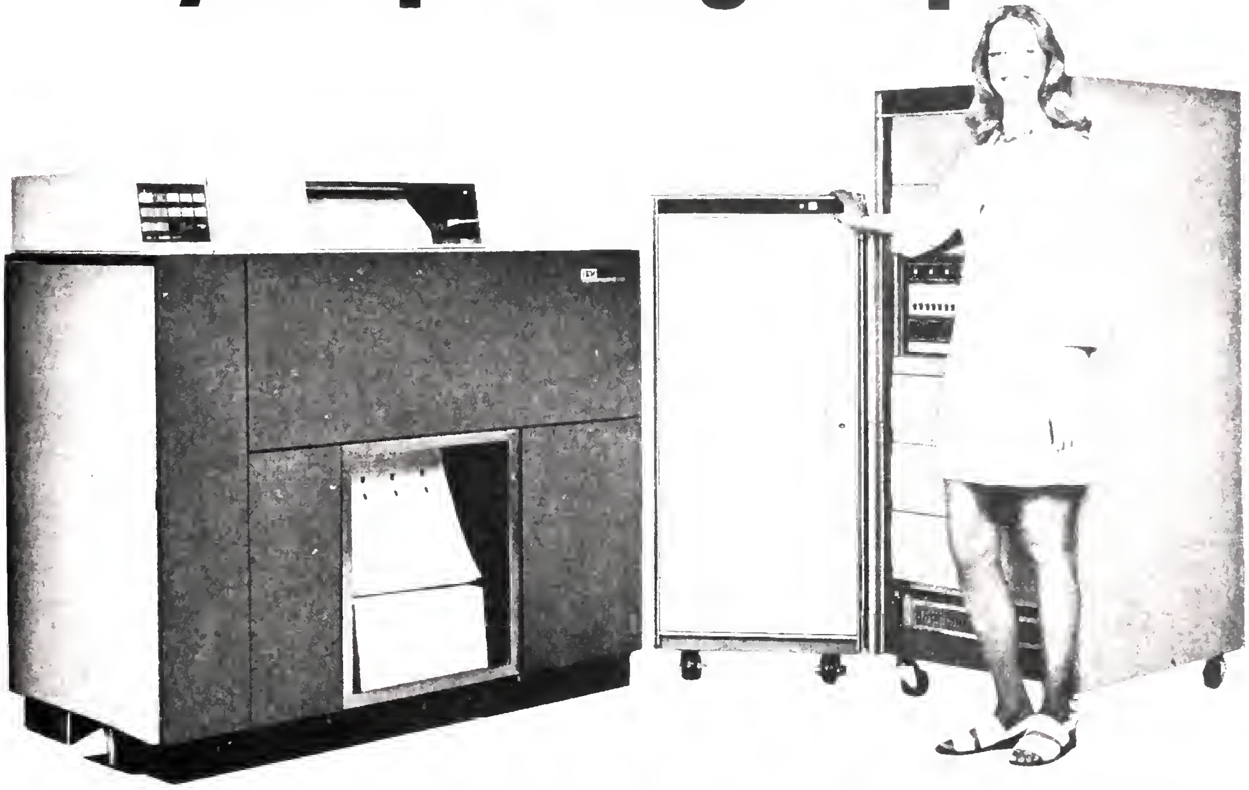

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WANG

Famed Specters of the Past Seem to Be Watching...

By Edith Holmes

Of the CW Staff

NEW YORK – In the dark, [illegible] interior of Courtroom 110 of the U.S. District Court for the Southern District of New York, the ghosts of industrial magnates of another age take [illegible] the wooden spectator [illegible] to catch a glimpse of the [illegible] trial of the century.

Many "robber barons" of the post-Civil War years are present at U.S. vs. IBM: Andrew Carnegie and his steel industry; J. Pierpont Morgan, Cornelius Vanderbilt and E.H. Harriman and their railroad empires; Jay Gould from the gold market; and John D. Rockefeller with his oil trust.

One wonders what they think of the case the government is bringing against IBM under a part of the antitrust law they inspired: Section Two of the Sherman Act of 1890 . . .

Under that section of the act, unamended in the last 86 years, the government has charged IBM with monopolizing the market for general-purpose electronic digital computer systems and the related markets of peripheral manufacturers and leasing companies.

In his opening statement last May 19 before Judge David N. Edelstein, who is hearing the case without a jury, Raymond M. Carlson, the lead Justice Department attorney assigned to this case, stated there are "two essential elements of a monopolization case."

Applying these specifically, he said the government would seek to show IBM had the power to fix prices or exclude competition and intended to exercise that power between 1961 and 1972.

To prove monopoly, the government must first prove the existence of the markets it has said IBM has monopolized. The corporation must then be shown to have monopoly power and to have intended to exercise that power, he added.

Market Share Critical

Since the trial began last spring, attorneys for the Department of Justice have emphasized testimony from industry witnesses dealing with the market shares of participants in the mainframe business. Certainly the government will contend its witnesses and their documents have generally put IBM's market share at 70% and that of all others at no greater than 10%.

Justice Department attorneys have been visibly elated when a witness telling the story of General Electric (GE) or RCA Corp. or Xerox Corp. in the computer business – has stated his company wanted to be "number two" in the industry with a 10% to 15% market share.

During its final arguments before Edelstein, the government will undoubtedly note the incredulity of some witnesses when asked why they didn't try to be number one.

At the moment, the government has countered IBM counsel's objections of hearsay to market share testimony with the offer of this information to show the state of mind of those participating alongside IBM in the business. The majority of the witnesses cited studies by International Data Corp., Quantum Science Corp. and Arthur D. Little and articles in trade publications as the basis for their knowledge.

In some instances, they have tried to keep track of such data as how many installations served by which vendors are in the field. Numbers for their own installations and shipments being accurate, companies like Honeywell and NCR have checked their records against figures published by market research firms and found these studies to be generally accurate to within 10% to 15%.

Analysis

The best records on competition in the computer industry, however, are thought to be those generated and maintained by IBM. The government has subpoenaed these statistics, but has yet to receive them.

Blocked at various legal turns, Justice Department attorneys doubt they will ever have this information at their disposal.

In addition to using witnesses from General Electric, RCA and now Xerox to draw a picture of the size of competitors in the systems marketplace, government attorneys relied on these people to illustrate IBM's dominance by allegedly fixing prices and excluding competition as well.

In general, testimony from the current or former employees of these companies has been that they had to have a price/performance advantage of 10% to 20% over IBM in order to be competitive with that corporation. In several cases, the advantage had to be as high as 40% if users were to accept non-IBM products, some testimony reads. Whenever IBM flexed its pricing muscles, the witnesses said, they eventually followed suit

Witnesses also detailed the lease nature of the bulk of the systems business. Dependent on initial large capital investments to meet development, manufacturing and marketing costs, leasing involves a return of revenues over the period of years for which the equipment is leased.

IBM had a lease base large enough to sustain these costs until that point in time when revenues would more than match them. Companies like GE and RCA were faced with the prospect of investing as much as $1 billion each before they reached the break-even point and their computer businesses became profitable, however, the government will surely contend.

Power and Presence

It may very well be that no person or corporation "forced" – in the sense of "threatened" – GE, RCA and Xerox out of the market for computers; but the power and presence of IBM certainly created barriers which made it untenable for even these corporate giants to go on, the government will argue.

While GE, RCA and Xerox officials "acknowledged they made mistakes in their computer operations," the government will contend the evidence demonstrates "IBM's dominance and the very large resources needed to sustain a lease market were primary considerations in their decisions to withdraw" from the business.

The government, then, is emphasizing these and other "outside" pressures leading to exits from the industry; meanwhile, IBM inevitably cross-examines the witnesses from these companies with the purpose of showing just what the internal "mistakes" were that contributed to the GE, RCA and Xerox decisions to withdraw.

GE's interest in and commitment to nuclear power and jet engines, along the lines of the company's traditional concerns and strengths; RCA's premature introduction of repackaged technology with the RCA Series that took the older Spectra 70 Series out of the market before its time; Xerox's 1972 reorganization of the management directing the computer operation and the obsolescence of its Sigma series coupled with delays in the development and manufacture of replacements: these factors also played a part – and actually formed the primary basis for the exit of these companies, IBM will stress.

(Continued on Page 11)

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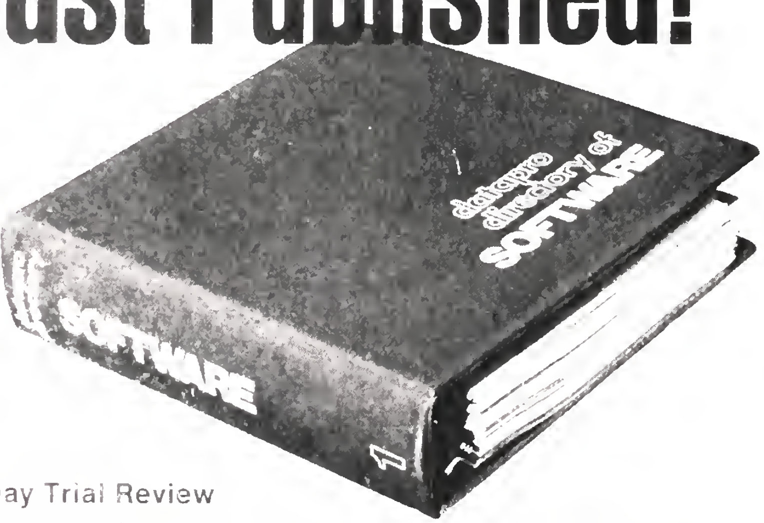

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CWFFF

. . . The Antitrust Trial of the Century: U.S. vs. IBM

(Continued from Page 10)

None of these companies had computers at heart, despite the management and resources that continue to place them high on *Fortune*'s list, IBM will certainly contend. They simply felt they had better things to do with their people, money and time.

At the same time, IBM has devoted itself to the industry: witness the testimony to the corporation's "excellent management" and "total commitment" by several of those from GE, RCA and Xerox who have taken the stand, the defense will argue.

The defense will also point out that the government seeks "injunctive relief" from IBM's alleged monopoly. That means the Justice Department can't limit to 1961-72 the time period in which the misdemeanor is to have taken place; monopolization of the general-purpose computer systems market must be shown by the government to be taking place today.

Accordingly, IBM is stressing the blurring of that specific market in recent years by citing the growth in sales and usage of minicomputers and intelligent terminals. If a general-purpose computer systems market ever existed, they will argue, it certainly can't be defined today.

Looking Ahead

Some confusion and a touch of amusement flicker across the barons' faces (Rockefeller's in particular). They agree that monopoly and the proof of its existence certainly has become more subtle since the 1890s. They remember when threats showed intent to monopolize.

Does the size of a company determine whether it is a monopoly? What is "market share"? What does it prove? they ask. They look forward to what they hope will be more clearcut: the conduct portions of the government's case.

The government has charged IBM with using practices like bundled prices, educational allowances to colleges, universities and institutes and "fighting machines" to maintain its position in the marketplace. The first part of this conduct portion of the case deals with bundling and has begun.

Contending IBM kept the prices for its CPUs and all the attendant parts of its systems bundled "as long as it was economically and legally feasible" to do so, the government plans to present evidence to show this practice permitted IBM "unlimited flexibility . . . to meet and thwart any competitive threat with whatever additional support services were necessary to win and hold onto any particular customer.

"Such flexibility allowed IBM to discriminate among its users, to in effect subsidize the marketing activities of certain key accounts at the expense of others in order to foreclose actual or potential competition," the government explained in its opening statement to the court.

The Department of Justice plans to present documents which indicate that IBM knew its users were receiving disparate levels of support, that some users were forced to pay for certain support whether they wanted it or not and that bundling was an enormously effective marketing tool for IBM and a de facto industry standard.

Five witnesses will take the stand in this part of the case. The first will be Larry Welke, president of International Computer Program, Inc.

He will be followed by Martin Goetz, senior vice-president of Applied Data Research; Jerry Enfield, president of The Computer Software Co.; Robert L. Brueck, president of MRI Systems Corp., and James R. Vaughan, president of Comma Corp.

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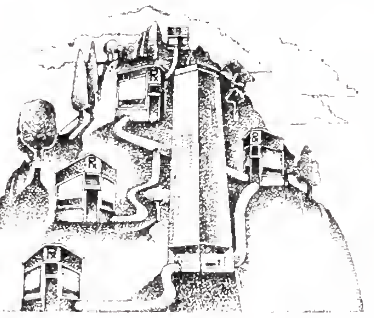

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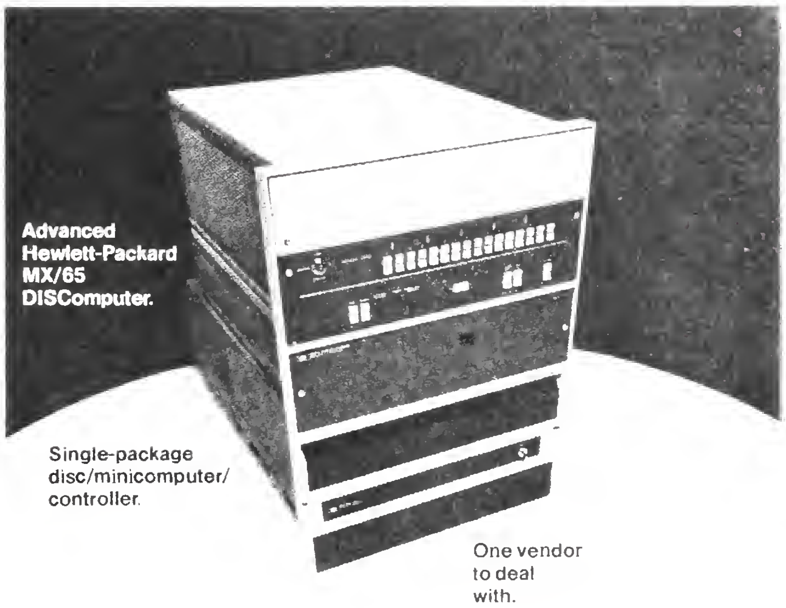

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8K to 128K words Solid state 4K RAM memory Microprogrammable Parity, EAU, floating point standard Brownout-proof power supply Optional Dynamic Mapping System	Links to multiple CPU Combined seek and transfer Built in error detection and correction Automatic track switching Data protect and recovery features	25 msec average seek time 15 Mbyte storage expandable to 120 Mbytes Exceptional [illegible] Kbyte transfer rate Operates over wide power and environment range

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Editorials

Social Boondoggle?

There is an immediate need for a wide-ranging investigation of the Social Security Administration (SSA) – and that organization's DP operation should not be spared in the probe.

The organization is under attack from a number of sources – both on its financial record and on its social necessity.

But closer to the interests of those in the DP field are the charges that the administration's computer operations are essentially out of control.

Experts within the agency have charged that SSA is planning to expand its computer facilities with a $69 million computer center which is not needed and also that the agency has not optimized its programs and operations in the computer field [CW, March 29].

In addition, those critics charged that SSA could be doing the job with fewer computer systems if such an optimization were to take place.

Furthermore, congressional critics have blasted the SSA for the purchase of computer equipment that is not needed – equipment valued at over $11 million and that is now in storage [CW, April 12].

These are serious charges.

It is clear that, without a huge investment in data processing, SSA could not fulfill its function, and its DP operation is one of the largest in the world.

If that operation is in fact poorly organized and nonoptimized, the waste factor could be enormous.

Hopefully, an independent body could be established to study the computer operations at SSA to determine the validity of the charges of waste and to document where and how savings could be made.

Already within the government there is an agency that could undertake such investigation as an impartial observer. That is the Federal Simulation Center (Fedsim) which provides performance evaluation and measurement studies for other agencies upon request.

The Congress should ask Fedsim to conduct a complete study of SSA, perhaps working with the General Accounting Office.

Such an impartial, outside investigation is the only way for the public – and for SSA officials – to determine what, if any, savings could be realized from an optimized DP operation.

Another Chance

With the publication of suggested standards for both Fortran and Basic [CW, April 12], users have been offered another chance to get involved with an area that could affect their whole operation.

Too often, however, users do not take advantage of these chances.

All users have a stake in language standards, but generally the voices of the manufacturers are more vocal when such standards are proposed.

The American National Standards Institute is actively seeking comments on the proposed standards and will welcome such comments up until early July.

Hopefully, users will get copies of the proposals from the issuing bodies, take the time to look them over carefully, assess the impact of the ideas on their own operations and make carefully prepared comments.

If users don't take advantage of the comment period, then they have nothing to complain about if the standards do not meet their needs.

Users should not wait until after the fact to assess the standards on their own operations, but should get involved now while there is still time for reasonable changes to be made.

'Apparently It's More Than Just a Psychological Barrier. . .'

Letters to the Editor

If Software Rip-Off Keeps Up, Vendors Won't Write for Hobbyists

Herb Grosch's column, "The Worm in the Apple," in the April 5 *Computerworld* was very much to the point. If this software rip-off keeps up, there won't be much software written for the computer hobbyist.

David W. Johnston

Washington, D.C.

New Concepts of Property Needed

One can hardly disagree with Herb Grosch's sentiments, as expressed in his column, "The Worm in the Apple" [CW, April 5]. Everybody is for the flag, motherhood and apple pie (not necessarily in this order) and against sin.

But one can hardly expect that laws against theft of personal property have any meaning when it comes to protecting property such as computer codes, which exist only as magnetic traces on disks or tapes. Not even the copyright laws are up to this task.

I believe that the time has come to formulate entirely new concepts of property and to establish a class of things, be they physical items such as computing hardware or intellectual items such as computer codes, which belong to society and not to any individual or legal person.

Otherwise we will need two policemen for every computerite to do nothing but watch against violation of traditional property rights.

Walter J. Samek

West Hartford, Conn.

Whole Industry to Feel Shock Waves

Herb Grosch's column, "The Enthusiasts," in the March 22 issue was most amusing to me.

Microcomputers do not surprise us, but the extent (but not the degree) of the enthusiasm has surprised us. In our brief five months of existence, with only one article in one of our dailies, we have signed over 200 paid members (at $12 per year).

Harry B. Bateman
Newsletter Editor

Denver Amateur Computer Society
Denver, Colo.

DEC Doesn't Pick Up Decus' Tab

I noticed in the March 1 *Computerworld* that Herb Grosch was rather animate in extolling the virtues of Digital Equipment Corp. I wish to remind him, however, that paying for Dec Users Society (Decus) cocktail parties is not of of them.

R.C. Davies
President

Decus/U.S.
Idaho Falls, Idaho

'Peopleware' a Firm's Primary Asset

Congratulations! At last CW has opened wide the forum for discussing human development problems in data processing. I hope "Peopleware" [CW, April 5] will be a regular feature.

While many of the problems with peopleware are very real in DP, let's try to keep in perspective the fact that our people problems are exacerbated by the rapid-change nature of the field.

In many organizations, DP is the first group to attend to, in a comprehensive and systematic way, the problems of human development.

These systems then become models for the rest of the organization's development needs. People are our primary asset, regardless of what area we look at.

Kate Oliver

Columbus, Ohio

Data Past

Five Years Ago
April 21, 1971

NEW YORK – The city's off-track betting (OTB) computer system fouled coming out of the gate when the actual betting began. Bettors waited up to two hours in line to place their bets through a manual alternate for the computer portion of the system developed by Computer Sciences Corp.

REDWOOD CITY, Calif. – Ampex Corp. rolled out its Terabit Memory (TBM), which uses videotape recording techniques to allow on-line accessing of 3 trillion bits of information – the equivalent of up to 32,000 reels of tape. The TBM system can store up to 5.6G bytes on a single reel of standard tape. At the upper end, the cost is about .0001 cent/bit, according to Ampex.

Eight Years Ago
April 17, 1968

NEW YORK – Computer stock prices continued to rise for the second week in response to President Lyndon B. Johnson's announcement that he had ordered a reduction of bombing in North Vietnam and that he would not seek reelection.

WHITE PLAINS, N.Y. – IBM introduced the latest versions of its Disk Operating System/360 (DOS) Release 15, Basic Operating System/360 (BOS) and Release 10 of its Tape Operating System/360 (TOS). These latest versions featured new optical character reading and data communications capabilities.

Author, Author!

I remarked last week, in discussing a political topic, about the intense interest of a part of our trade, the college professors and the research people, in publication. For the rest of us, strangely enough, almost the reverse is true: producing documentation of systems, of systems software, and applications is one of the hardest and least enjoyable tasks we have to perform or manage or demand.

Now, there is an obvious reason why our academic buddies, especially in North America, are so anxious to write, and are willing to endure the painful processes of footnoting and bibliographizing, and refereeing and being refereed, and rewriting, and even *in extremis* reading the stuff after publication. Their careers, especially in the cluttered groves of Academe, depend to a frightening extent on publication. I deplore it, but that's another matter. We all know that it's so.

Can we turn this around and use it to help the practitioners, the people who have Real Problems? Well, for a sample, let's look at our suffering software tribe. They change jobs frequently. As in the professoriate, promotion to new responsibilities or a salary jump above the rather shallow slant of regular progression often requires a move, or at least the threat of one. And regretfully I have to say that many software artists run down the mooring lines of a sinking program, to avoid going down with the ship later.

And some of them just plain old get bored the assembly line thing. And quite a few do it to avoid the onerous job of documentation.

I believe a partial solution to many of these and related agonies is to permit, then to encourage, and ultimately to require attribution. Programmers should sign their work!

Examine some of the effects. First, pride in one's work: unreservedly a Good Thing. Second, a verifiable portfolio to show current bosses, higher level management, and prospective employers. Third, a clear statement of Who Done It — the fingerprints of the criminal! Fourth, a trace mechanism: how often would one like to know why something was done in a software package, only to find that the shop of origin has broken up or been remanned? Purchased, one has a chance. Obtained from a remote cranny of one's company. Shared, traded, leaked — not much.

Fifth, professional standing to match the academics and the researchers. In climbing the ACM, DPMA, AFIPS ladders (which some people do from general competitiveness, some to pay back a profession that has been good to them, and some for merit badges and pay raises) the software practitioner is at a considerable disadvantage *vis a vis* the professor. Credit for major work would be a great help, and our trade is getting a tad large for all-grapevine attribution.

There are problems, of course. Many programs are not circulated widely, are not available for the asking. But even where there are heavy proprietary or security restrictions, the first page or two of the manual, the first disk track or two of the program, the first sheet or two of printout could usually be shown.

Then, large programs are mostly team efforts. Could we have a hundred signatures on a data base management package, or an operating system? Well, why not? Scattered through the body of the work, like the initials of the authors in the Britannica? And grouped in credit pages at the beginning? Sure! There ought to be specialist credit, too, if the documentation is done separately, credit for that ought to be given, and given relatively equal weight, with that of the systems analysis and the coding.

This idea came to me in a rather different form, during my hitch with the Old IBM in the Forties. I noticed that in the draft of a proposed World War II history, and then more broadly in new-machine manuals and the like, that the single employee name mentioned was Tom Senior. Only in formal engineering or management publications — or an interesting exception in a funny customer-dominated trick-applications internal pub called "Pointers," was an IBM engineer or systems girl or technical salesman ever identified.

As the Giant went more and more heavily into research, publication in its own technical journals and in the proliferating association and trade magazines was encouraged. So the vague feeling I had that something ought to be done slipped away — and was only revived last year.

I believe we need to be proud — and we need to be responsible. The trade would benefit, the professional societies would benefit, consumers would benefit. Sign the stuff!

Herb Grosch

Improvement Over Deeds Method

Check-Digit Technique Catches Many Transpositions

The Taylor Report
By
Alan Taylor, CDP

If you would like to have your own private check-digit system that wouldn't get confused with the system running down the street, you could do worse than writing to Prof. Magdi Riskalla of Babson College in Wellesley, Mass. and asking him to help you.

Riskalla is currently sitting on a list of 3,404 numbers, any of which he believes can form the basis of a better check-digit system than anything else in the literature.

He has some figures to back up his ideas, too. For instance, take the number "0249531678." If this is used as the basis of a Deeds-type check-digit system, it greatly reduces the chances of transposed numbers getting through the check.

Both the original Deeds number, "0496183275" [CW, Feb. 23] and the new Riskalla number catch any single wrong number or any transposition of adjoining numbers.

But when there are intervening numbers between the transposed digits – such as when "23405" is written instead of "23504" or "25403" some do get through. The idea has been to reduce that number — called the false checks percentage — as far as possible.

In a test comparison with the Deeds original number earlier this month, Riskalla reduced the number of false checks with transpositions across a single digit (the 305 to 503 type) as follows:

- Check Digit 0 — 20.4% cut to 11.7%.
- Check Digit 1 — 20.4% cut to 11.7%.
- Check Digit 2 — 14.6% cut to 8.8%.
- Check Digit 3 — 20.4% cut to 8.8%.
- Check Digit 4 — 20.4% cut to 9.3%.
- Check Digit 5 — 20.4% cut to 10.7%.
- Check Digit 6 — 19.0% cut to 10.2%.
- Check Digit 7 — 17.6% cut to 10.8%.
- Check Digit 8 — 16.6% cut to 12.5%.
- Check Digit 9 — 19.0% cut to 10.7%.

Riskalla argued that this "over one-digit" transposition is probably the next most important one to correct after the adjoining-digit transposition — which can be caught by many systems.

He still takes great interest in the other transpositions — over two, three, etc. digits — and his method appears to be working here also. Transposition over three and four digits using the original Deeds number shows some considerable percentages of "false checks" apparently related to the 1/4 and 4/1 series which are embedded in the 0496183275 number.

By avoiding any such embedded repetitions (which was the basis for the selection of the 3,404 Riskalla numbers), Riskalla hoped to avoid these weaknesses as well as potentially improve the situation in the transposition over one and two digits. The table indicates he seems to have achieved this also.

Future Moves

Where does this leave computer users? Well, it's hard to say. Few people have studied the work of Black, on which both Deeds and Riskalla based their approaches. After all, that was published in the Institute of Electrical and Eletronics Engineers (IEEE) journal, which isn't what everyone is reading. And neither Deeds nor Riskalla has yet published.

Moreover, when they do publish, it will not be in immediately understandable form so far as most computer analysts are concerned. The math depth of the approaches is more unfamiliar than complicated. But it is unfamilar — and therefore uncomfortable — to most of us.

It will probably be some time before an appropriate understanding of the results that have been reached to date is widespread, or before any new systems come into use.

Check Digit	Transposition Over:			
	Three Digits		Four Digits	
	Deeds	Riskalla	Deeds	Riskalla
0	22.8	4.4	55.6	none
1	22.8	9.8	45.4	11.7
2	11.1	8.9	11.1	none
3	none	11.1	45.4	11.1
4	25.0	25.6	44.4	11.1
5	8.1	4.4	33.3	11.1
6	8.7	8.7	none	none
7	8.9	11.7	33.3	none
8	4.6	8.3	33.3	none
9	8.6	8.4	33.3	11.1

The above percentage performances indicate the false checks occurring when one of the Riskallan numbers was used in place of the original Deeds check-digit number during a trial test recently. The lack of any large percentage figures for false checks in the Riskallan results, by comparison with the Deeds original results, was one of the aims of the Riskallan system.

But with all these caveats, some things stand out. These are:

- A 10-digit check system is possible. The arguments of supporters of 11-digit and 13-digit systems that the 10 (0-9) digits were incapable of giving adequate protection were based on less-than-optimal use of the 10-digit systems and must now be reevaluated.

- A smooth checking-level curve is possible. Using the Riskalla numbers there appear to be no sudden jumps or dips in the percentages of errors caught as the number of digits over which the transposition takes place occurs.

This is a major security precaution, as well as being an absolute improvement in theoretical performance.

- Dual errors are still checked randomly. So far we seem to have no approach that considers the situation when two digits are incorrect — other than when they are transposed. Nor do we have any approach which considers two transpositions.

As longer and longer numbers are being used, particularly those numbers which are over 10 digits long, the importance of finding such an approach increases.

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Reader Commentary

Visually Handicapped Could Use A Little More Help Taking CDP

The following contains excerpts from a letter sent to John K. Swearingen, then president of the Institute for Certification of Computer Professionals (ICCP), by Helen E. Moore of Denver, Colo.

I am a blind systems analyst employed by the Computer Services Department at the University of Colorado Medical Center. On Feb. 21, I sat for the Certificate of Data Processing (CDP) examination administered at the University of Denver.

Because of my experience in taking that examination, and after discussion wtih Robert Gildea, vice-chairman for the blind of the Association for Computing Machinery's Special Interest Group on Computers and the Physically Handicapped, I feel compelled to express my comments to you. Gildea and I seem to share similar views and experiences relating to the CDP examination; these very likely are held by other visually handicapped CDP candidates as well.

Visually handicapped persons seek no special concessions when applying for the CDP examination or in any other instance. However, when reading is involved, obviously some means of adaptation or particular consideration must be made.

I included a letter to ICCP with my CDP application, prepared on Nov. 5, 1975, stating I would require assistance in taking the examination. At that time I offered to provide my own reader.

I stated further that, if ICCP wished to provide such a service, I certainly had no objection, but that I would expect the reader chosen to be capable of reading the specialized materials.

Receiving no acknowledgement of that letter, I ultimately telephoned [Swearingen's] office in New York on Feb. 2 to inquire about arrangements for the upcoming examination. I was pleased to learn my letter had been received and acted upon by your staff.

Some Suggestions

I respectfully submit the following recommendations to ICCP and to visually handicapped DPers applying to take the CDP examination. In so doing, my hope is that my own experience will result in future arrangements for administering the CDP examination to visually handicapped candidates that will prove far more satisfactory than in the past.

Therefore, please consider the following as possible approaches:

- Since the blind candidate is unable to read the examination for himself, selection of a competent person to do this reading is of the utmost importance.

The ability to read aloud for long periods of time is found in relatively few people. For this reason, I very strongly concur with the suggestion made by Gildea in 1966 in which he asked the Data Processing Management Association that the blind CDP candidate be permitted to bring the reader of his choice and that the examination be administered in the presence of an appointed proctor.

The candidate sitting for this very difficult and lengthy examination is under considerable pressure and should not be subjected to the additional stress brought on by a reader who is able neither to read aloud at length nor to cope with the terminology and graphics. I believe that the candidate deserves the assurance that the questions are being read accurately and that the responses are being marked as he directs.

I feel it is most important the candidate never be given the feeling during the examination that he is inconveniencing the reader. Therefore, if chosen by the candidate, the reader would be a person known to be accustomed to this kind of activity and the conditions thus described would be alleviated.

- An alternate approach to the first recommendation, in my opinion, would be to have a professional at ICCP record the examination on cassette tapes which would be forwarded to the examination site.

Most people have access to such a machine for playing these tapes. The candidate could replay the questions as he needed. A person could then be provided to record resonses on the answer sheet.

It would be much less difficult to find someone to mark responses than to find one to do the reading. I feel that this method could be a workable approach in administering the CDP examination to visually handicapped candidates.

- If ICCP continues to provide the reader for the blind candidate, I strongly urge that a stringent screening process be employed in the selection of this reader. Guidelines should be established to assist in determining the competence of the person chosen for the task.
- Regarding the preparation of a CDP candidate, I can strongly recommend the approach taken in my department. William Sweeney, manager of programming, provided four of us interested in taking the examination with an excellent cross-section of reading materials covering all areas included in the CDP.

Also, we were given the benefit of weekly seminars in which the reading materials were discussed and further information and instruction provided. I have these materials recorded on cassette tapes by a very good reader and would be most happy to share these tapes with other CDP hopefuls.

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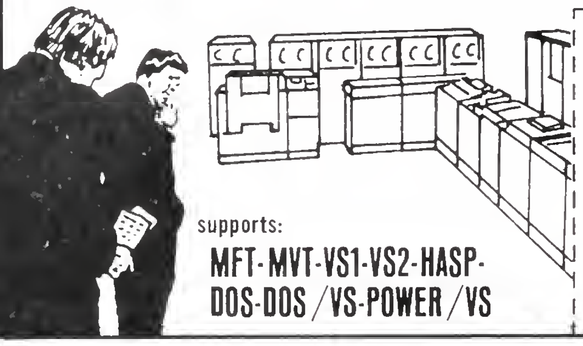


University Uses DBMS as Statewide Services Base

By Don Leavitt
Of the CW Staff

CLEMSON, S.C. – Since 1974, the Division of Information Systems Development (DISD) at Clemson University has converted most of its files from an Index Sequential Access Method (Isam) to a data base management system (DBMS).

And that change has resulted in increased throughput and expanded services to statewide agencies, according to division director John C. Peck.

Although the heaviest demands on the university's IBM 370/158 come from on-campus academic and research programs, DISD has sought and won several major systems development contracts throughout the state. Isam "simply could not handle the volume or volatility" imposed on the system by as many as 22 government agencies, Peck said.

Clemson required a data base system for applications that could be fully designed and implemented in a short time frame. Other selection criteria were the availability of a recovery capability, operational speed, amount of memory required, cost and Codasyl compatibility.

During the fall of 1974, Clemson examined four data base systems: Cullinane's IDMS; IBM's IMS; MRI's System 2000 and Software AG's Adabas. The university selected IDMS.

One of Largest

Clemson's public health information system, one of the largest IDMS applications, provides access to medical records for patients receiving health services throughout the Piedmont region. County officials communicate with the data base through IBM 3270-compatible terminals.

During the spring of 1975, the network grew to approximately 100 terminals and 40 printers in support of an interagency data base, maintaining data for over 140,000 people.

The base application is built around on-line update and retrieval with batch processing each night to accommodate an average of 1,000 transaction/hour, jumping to 3,000 during peak loads. A multidrop network runs under IBM's Telecommunications Access Method (Team) through linkages established by IDMS' Generalized Communications Interface (GCI).

GCI also provides on-line recovery by writing all data base changes to a journal tape, along with beginning-of-job and end-of-job checkpoints. In case of a program abort, IDMS' Central Access Method Program notifies the console, then rolls back the journal tape applying "before" images to affected areas of the data base, Peck said.

Clemson's social services system works with a separate IDMS data base to support child care for handicapped and mentally retarded citizens.

This application maintains eligibility and service plan data for applicants and control data for case managers and providers. Complete data collection facilities as required by the federal Department of Health, Education and Welfare for calculation of grants in aid is also part of the system, Peck said.

Fundamental Uses

Using IDMS for more fundamental DP purposes, DISD has developed a Generalized Screen Management System (GSMS) to support full-screen "fill-in-the-blanks" applications for CRT terminals. This system provides editing of data records and operator input and maps from stored records to a CRT screen with formatting and table lookup for codes.

Output of GSMS is a data stream coded in the language of a "conceptual terminal" that contains all the functions found in most popular terminals on the market today, Peck said. Just before transmission, processor table-driven translates this code to the code needed by the real target terminal.

A reverse translation process changes input data from machine code to "conceptual terminal" code automatically.

When Clemson converted to IDMS, it dramatically increased throughput, the DISD spokesman said. For the public health application, using Isam, the division averaged 160,000 I/Os per day. After converting two-thirds of the medical files to IDMS, I/Os dropped almost 50%, he added.

Equally important, Peck said, has been the reduction in real time needed for each transaction – from an average of 2 sec with Isam to .8 sec with IDMS.

Reclaiming a System – Part 2

Teamwork Prevails, New Work Installed on Time

By Don V. Fletcher
Special to Computerworld

LIVERPOOL, England – After installation of Mark IV [CW, Apr. 12], our development group at Royal Insurance was organized into six project teams to design new agency, policy and claims systems.

The agency system was to be designed by a three-person team, the input and edit programs by a team of five people. Additionally, several teams of four to six persons worked on a major policy update project, a new claims system, validation and clean-up operations on existing files and a special Mark IV routine to link automobile policy information with the new claims system.

A full-time consultant was hired for six months to advise all the project teams. As usual, one or two people emerged as the Mark IV "experts" on each team who spearheaded the effort.

Many of Royal's existing standards for design, programming and documentation had to be changed for the new systems. In particular, new documentation standards had to be developed to supplement those available from Mark IV.

The agency system was implemented in April, exactly on time. We had about three months of solid success after the huge agency system was put into operation.

In the other project teams, request testing was well advanced and by April the various requests were being put together into the full version of the programs.

A snag developed, however, when the requests started exceeding the available core for temporary fields in three subsystems; edit, policy update and claims update. The only viable solution was to get rid of all temporary fields, constants and pattern validations from the individual requests.

These were then placed in a coordinated work file. This was a major effort, taking Royal several weeks.

We also had another problem. When running a program containing exactly 250 requests, dumps occurred if there were more than 18 requests with "back branching" and when the "find segment" operator was used.

Some of these problems were sent to informatics headquarters in Canoga Park, Calif., for investigation, but we were able to find a way through the difficulties without guidance from Informatics.

Systems clearance began in June 1974. The most taxing part of the systems clearance was in communicating between the new systems being written and the existing IBM 360 which was to remain. Subfiles had to be output and reformatted to conform to the old system.

This proved the trickiest part of the operation, and our systems clearance had to concentrate on getting these files right. To this extent our systems clearance on the actual Mark IV systems was not as thorough as we would have liked, but we decided to go ahead with the planned implementation date at the end of August.

(Continued on Page 18)

MSA General Ledger Update Includes DBMS Links

ATLANTA – Changes in the handling of budget information, custom reporting requirements and interfaces with data base management systems (DBMS) are among the enhancements in Release 18 of the MSA General Ledger system now being distributed by Management Science America (MSA), according to a spokeswoman.

In function, the package goes well beyond what has been traditionally considered general ledger accounting, she said. In addition to budget development and monitoring, it also supports cost allocation operations, responsibility accounting and profitability reporting, she explained.

Release 18 simplifies the creation and approval cycles for budgets, while one of the subfunctions provides the ability to prorate annual and quarterly budgetary amounts by determining from a fiscal calendar the number of days in each respective period.

Other elements in the budget area provide modeling capabilities so planners can anticipate the potential effect proposed changes would have and the facility to relate an account to multiple base accounts, she said.

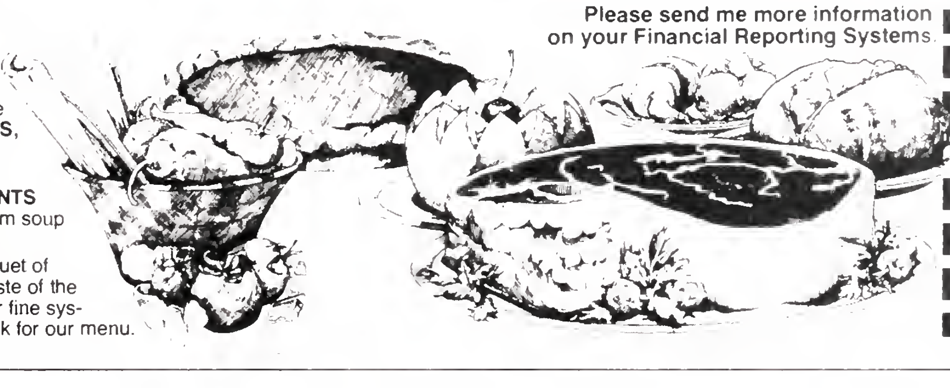
In addition to the custom reporting facilities that have been part of the MSA package in previous releases, the latest update includes support for both organizational and consolidated reporting.

Organizational reporting identifies the relationships of each responsibility center, and Release 18 makes available nine pyramids with as many as seven tiers in each, MSA said.

The data base support available in Release 18 encompasses on-line editing and validation of input data as well as a variety of options on the file system to be used. Users may, for example, link application programs to their current file-in-file-out external I/O modules.

But the package also provides linkages to IBM's IMS (utilizing the Hierarchical Index Sequential Access Method), to a MSA-provided Inplace Index sequential data base or to other data base systems such as Cincom Systems' Total through use of a "translator card."

The updated MSA package, written in Cobol and operational under Burroughs and Honeywell as well as IBM environments, costs from $30,000 to $70,000 from MSA, Suite 1300, 3445 Peachtree Road, Atlanta, Ga. 30326.



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Manager Should Develop Staff's Human Qualities

Peopleware

By Jack L. Stone
And Alexander P. Grant
Special to Computerworld

To meet their obligations for personnel motivation, managers need the knowledge, skills and procedures that provide a sound basis for the management of computer center people as rational beings as opposed to mere extensions of the hardware software resources.

The second in a series by these authors, this article describes the concepts behind "human resource management" and the advantages they see in applying those concepts.

The next article will deal primarily with the [illegible] pros and cons of [illegible] as a management tool.

Collectivley, the management functions that relate specifically to the development of the human qualities of people to increase productivity might be called "human resource management."

The major functions that comprise human resource management include:

- Identifying and defining human resource requirements of the computer center.
- Identifying and defining quantitative and qualitative measures of productivity for each individual.
- Developing and documenting policies and procedures for evaluating individual productivity supported by actions to recognize and reward accomplishment.
- Defining and documenting individualized career plans which integrate objectives for job assignment and formal training to develop the maximum productivity potential of the individual.
- Defining and documenting policies and procedures for recruiting, organizing, assigning, supervising, demoting and discharging employees.

The human resource requirements of a computer center consist of the knowledge, skills and personal characteristics needed to process the center workload at acceptable levels of quality and timeliness. The requirements statement sets the human resource objectives to be met to accomplish organization goals.

To interest top management in supporting actions to meet human resource requirements, the requirements of the computer center must be ultimately stated in terms of position titles, numbers of positions and salary levels.

To develop these numbers, computer center planners need to perform several analytical tasks, including:

1. Detailed definition of the functions and/or tasks that must be performed to accomplish the projected workload.
2. Identification of the types and levels of skills, knowledge and personal attributes required to successfully perform each task or function.
3. Definition of each type and level of employee required in terms of the tasks or functions to be performed and of the skills and knowledge required for successful performance.
4. Estimates of the expected workload to be performed by the individual in terms of quantitative and qualitative descriptions of each task or function to be performed.

Relating expected workload to defined positions to produce projected manning requirements and availability schedules.

Obviously, the first time this planning procedure is performed it will be difficult and time-consuming; however, subsequent updates will be comparatively quick and easy.

In addition to providing solid justification for the manning plan, this procedure provides the additional advantages of assuring that employee assignments are consistent with individual skills, knowledge and personal attributes; available personnel are assigned jobs and tasks in accordance with documented computer center objectives and priorities; and hiring, promotion/demotion and terminations are based on documented job requirements.

An objective determination of productivity on the job requires a documented set of quantitative and qualitative measures of productivity for a particular job. Although some individual measures of productivity are obvious (key strokes per hour or lines of code per day), the fact remains that computer center people often work in teams to develop, implement and operate DP systems.

It is, therefore, nearly impossible to establish individual quantitative measures and to rely on such measures alone to support evaluation of individual productivity.

On the other hand, quantitiative productivity measures can be established for team units, and individual accomplishments can be recognized on the team basis as well as on an individual basis.

Purposes Served

Realistic and objective measures of human productivity serve many purposes, including forecasting of human resource requirements, evaluating individual performance on an objective basis and recognizing individual accomplishment.

The last purpose stated is particularly central to effective human resource management. Success in motivating people for productivity requires that each worker has reasonable assurance that superior performance will be recognized and rewarded in a fair and equitable manner.

Rewards for good performance can take many forms: salary increases, bonuses, promotion, opportunity for additional education or training, opportunity for desirable assignments, additional leave, awards or public recognition and so on.

Similarly, negative actions such as salary decreases, demotions, or, in extreme case, terminations can be rationally justified in cases of poor performance.

In short, the capability for identifying better workers on an objective basis provides the opportunity to keep and develop the best people.

A well-conceived and well-executed program for people development can make a major contribution to attainment of improved productivity in the computer center. Such a program may have many facets, including career planning and career counseling, educational support, on-the-job training and formal training.

Stone is the managing director and Grant a senior associate of Computer Education International, Inc. of Washington, D.C.

"Why MARK IV?
Twice the productivity with
no increase in staff."

By Jim Harder
Manager, Technical
Planning and
Development
Boise Cascade
Corporation

"Within the past two years we were able to support twice as much development activity without a staff increase, largely due to MARK IV.

"Not only that, most of our MARK IV Programs are completed significantly under traditional Cobol programming estimates, as much as 100% below Cobol estimates. A combined program to create files from our labor distribution input was budgeted at $3000. We did the job for $1200. The reporting programs were estimated at $3900 and we spent $2500. And these results are typical.

"With MARK IV you get a lot of work done both easily and quickly. We recently converted a chain file maintenance system — an antiquated IBM bill of materials access method — to DL 1. MARK IV reduced what would have been a major project in Cobol to nothing more than a slight change in file definition. With MARK IV's independence of files and access methods, we were home practically free — we did the job in a day.

"A lot of our old assembly-language-based programs are very difficult to maintain, so we're converting them all to MARK IV. We've put up several data bases in MARK IV to get our systems into a more maintainable environment.

"Programmer acceptance of MARK IV is excellent. Since it does away with so much of the busywork of Cobol, it lets analysts become programmers and vice versa. Our people can get involved in the whole problem.

Our end users not only like it, they recommend its usage. Several people in our Compensation and Benefits area who have become proficient in MARK IV are running a DL/1 data base covering 30,000 employees. They do all their own report writing. Most of their stuff is ad hoc, and they are able to respond very quickly.

"There's no doubt about our enthusiasm for MARK IV. We're super happy."

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Gains DP Community Support

Good DBMS Course Keys on Design, Implementation

J. Daniel Couger On *Education*

The rapidly accelerating interest in data base management systems (DBMS) necessitates new courses on the subject. As a basis for discussion, consider the approach used by Dr. Clay Sprowls of the University of California at Los Angeles.

Course Outline

(10 weeks, 5 quarter credits)

1. Contrast the application and the data base approach to DP.

2. Review data storage organizations with emphasis upon list structures.

3. Develop a further rationale for data bases that use these data structures.

4. Present an overview of DBMS characteristics that leads to a one-page student fact sheet with which to summarize any system, summarizes different existing systems using the fact sheet and underlies assignments to review new systems.

5. Review the Codasyl Data Base Task Group (DBTG) report of April 1971 and subsequent extensions and recommendations for its relationship to systems studied in (4) and the record and set architecture recommendations.

6. Design a student-sized data base with one application example worked out for use by all students and other examples from which students may select to develop their own data base.

7. Implement the student data base by defining the data base in the Data Definition Language (DDL) of one system, preparing test data, writing application programs using the Data Manipulation Language (DML) or a query language available in the system and loading a test data base on a computer and executing application programs or queries utilizing the test data whenever and wherever access to the DBMS can be obtained.

8. Review the role of the data base administrator.

9. Review the role of the data dictionary/directory.

The design of a student-sized data base (Part 6 of the course outline) is a critical part of the learning experience. A project that includes design and implementation is the heart of the course.

Philosophy on Student Project

A critical assumption underlying the student project is that an operational system is available. Without access to a system, the project stops short of an implementation.

The project can end with a description in the DDL, with test data and with simulated queries of application programs. Sprowls believes this is a "valuable learning experience that suffers only because one is never quite certain that the data base is defined correctly, that the data will load and can be processed correct."

According to Sprowls, one may implement Part 6 of the course outline in a number of ways. Design of a simple data base from a short scenario and a list of questions "is a must." Description in the DDL of some system "adds a real-world flavor to the project."

Loading the test data base and running application programs or queries against it "is the ultimate test that the whole data base really hangs together."

Student reaction to the data base course in its present form is consistently that it is a lot of work, but worthwhile because it provides an in depth understanding of data base development.

The most recent "community" reaction is perhaps best summarized by the willingness of a number of different companies to provide access to a DBMS on their computers.

Both vendors and users cooperated in this venture and programs have been run in both batch and terminal-based systems.

Reactions to Sprowl's approach is invited. Other approaches will be described in subsequent columns.

Couger is professor of computer and management science at the University of Colorado.

'CLIdebug' Aids AssemblerCoder

ALBANY, N.Y. Batch-oriented Assembler language programmers working in IBM OS or VS environments can have "all the development and debugging services usually only found in time-sharing systems and high-level languages" by utilizing CLIdebug, according to the package's vendor, Computer Linguistics, Inc. (CLI).

CLIdebug facilities include interruption monitoring and automatic recovery as well as temporary modification of data and instructions. It also supports externally specified execution breakpoints, snapshot dumps of registers, buffers, instructions and data, CLI said.

Externally invoked instruction-by-instruction tracing is useful for pinpointing exact causes of problems, while external measurement of execution frequencies – another CLIdebug capability – is available for performance evaluation, a spokesman said.

CLIdebug's facility for monitoring execution frequencies is particularly useful for installations attempting to optimize production programs under actual operating conditions, the spokesman said.

Although intended for Assembler development work, CLIdebug can be applied to programs in high-level languages as well since it works with object and not source code.

Object code for the CLI package itself, along with installation support, is available for $150/mo. Source code will be provided for a one-time fee of $3,875, CLI said from 24 Aviation Road, Albany, N.Y. 12205.

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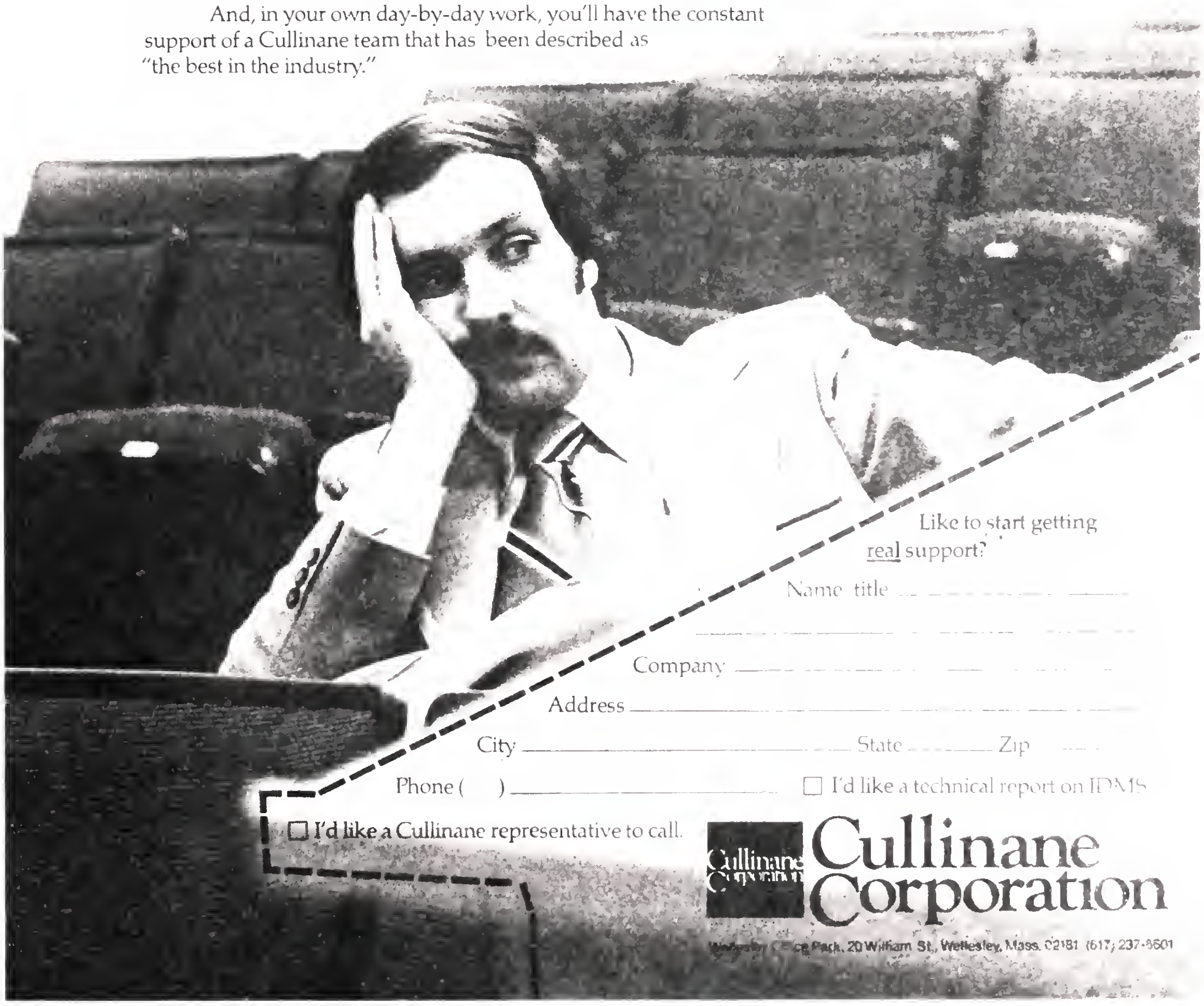

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Package Backs NC Lathes

WHITE PLAINS, N.Y. — The Ingersoll Lathe Program, now available as an installed user program from IBM, solves the problem of providing "adequate, efficient and economical" numerical control (NC) tapes for two-axis lathes, according to the vendor, by relegating "all repetitive work to the computer."

In addition to [illegible] loops with small part [illegible] start cycle times, the program includes extensive libraries of predefined tools, tool assemblies and [illegible], IBM said.

Part [illegible] "feeds and speeds" and other elements of turned-part programming are also present, the company added.

Working in a conversational language, the part programmer retains responsibility for determining the sequence of operations and for those aspects of part programming requiring judgment, a spokesman said.

The program's edit routine, on the other hand, includes "extensive" checking to avoid collisions of tools, parts and machines, he added.

Exit facilities allow use of Fortran or other languages for computations; a generalized macro facility is based on Fortran syntax math. Once defined, macros may be stored for later use.

The Lathe program, written in VS Assembler, is intended for use with OS/VS1 and Release 3.1. It operates as an independent program, but can be used in conjunction with IBM's Design Aid for Postprocessors feature for its various APT program products.

The package, which requires 256K and one 3330 spindle in addition to any space required by the operating system, carries a monthly license fee of $665, which is waived after the first 12 consecutive payments, IBM said.

Major System Rebuilding Ends As Teamwork Pays Off 'Royally'

(Continued from Page 15)

The policy file system was implemented over a period of four weeks, beginning in August. The conversion involved 250 hours of processing, and the printing of the turnaround documents for each policy absorbed 450 printer hours.

Despite some hardware problems, the operation was completed on time. Six weeks later, the new claims system was implemented as a single operation, completing the implementation of the entire new system.

We believe this is almost certainly the largest Mark IV program running regularly anywhere in the world. At present, about 85% of the CPU is utilized, and it runs for 225 minutes a day.

The size of each record on the policy file can vary within fairly large boundaries, but the average size is 300 bytes. The maximum size for some policies may soon approach the current 7K block size.

With an average of 300 bytes and two million policies, the total size of the file is 600,000 bytes and occupies 13 reels of tape.

We met our objectives with Mark IV. Our large programs were implemented quickly and are easily released and flexible enough for changes to be made quickly.

By using Mark IV, we were substantially helped in meeting these objectives. We do not know of any other way in which we could have implemented a system in the same time frame.

We are designing a large statistical extraction program to provide a wide range of information and develop additional components of the fully integrated system. In addition, however, we are also engaged on a large staff information and payroll system which is also being written entirely in Mark IV.

We are, therefore, planning to continue to reap the advantages which we have already enjoyed.

Fletcher is systems manager at Royal Insurance of Liverpool.

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Inquire's Host Procedural Language Interface (PLI) allows COBOL, PL/1, FORTRAN, or assembler programs data base access via multiple keys. PLI is written as a set of re-entrant modules — permanently resident and shared by all users. Of course, Inquire's PLI is multi-thread. Acts independently of data organization and storage techniques.

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Inquire employs a partially inverted hierarchical or network data structure. Any number of data elements can be quickly searched, following a path of least resistance. And search time does not directly increase with data base size.

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Performance Evaluation and Improvement

Saul Stimler, author of *Data Processing Systems: Their performance, evaluation, measurement, and improvement* will lead this two-day seminar on measurement techniques designed to save your installation money. As well as system performance at your own installation, topics covered include: Criteria for quantifying performance, pencil and paper analysis of a system, Benchmarking techniques, Realtime, Batch and interactive time sharing systems.

Cost for the seminar, including continental breakfasts and luncheons and all course materials is $250.

New York	Hilton	May 10-11
Chicago	Hyatt Regency O'Hare	May 17-18
Wash., D.C.	Stouffer's National Center Inn	May 24-25

Data Communications Course #1010 – Practical Data Communications Systems & Concepts

Dr. Dixon Doll, the nationally recognized teleprocessing consultant will lead this two-day seminar on the newest advances in data communications. The course covers areas like SDLC, HiD, LoD, DDS, newly approved major revisions to WATS, and the impact of Satellite Carriers.

Total Cost, including workbook, reference materials, luncheons and continental breakfasts is $450. Additional registrants from the same company qualify for the reduced rate of $300.

New York	Plaza Hotel	June 14-15
San Diego	Plaza International	Sept. 27-28
Denver	Denver Hilton	Oct.

Data Communications Course #1020 – Advanced Teleprocessing Systems & Design

Also led by Dr. Dixon Doll, this course is a follow-up to course #1010. Special emphasis is given to techniques that minimize operating costs in commercial data communications networks. This three day seminar covers procedures, approaches, and algorithms for evaluating and cost optimizing network operations. Total cost, including an extensive set of customized course materials, is $450. Additional registrants from the same company qualify for a reduced rate of $400.

New York	Summit Hotel	Sept. 13-15
Miami	Holiday Inn Airport Lakes	Nov. 29-Dec. 1

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Under the instruction of Roy N. Freed, a nationally known lawyer, author and educator in the field of computer law, you'll learn how to increase your advantage in dealing with vendors that supply your installation. As well as practical discussion and review of your own contracts, subject areas covered in this 2½-day seminar include: Negotiations, Contracts, Warranties, Avoidance and resolution of disputes, Security, Fraud, Taxation, and Techniques for handling any transaction. Cost for the entire seminar, including continental breakfasts, luncheons and all course materials is $325. Additional registrants from the same company are charged only $275.

Seattle	Airport Hilton	May 5-7
Chicago	Hyatt Regency O'Hare	June 16-18
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CCITT Accepts Packet Standard

NEWTON, Mass. At least two packet-switched services available to North American data communications users will implement the recent international recommendation adopted by the International Consultative Committee on Telephone and Telegraph (CCITT).

The recommendation, known as X-25, favors the virtual call method for interfacing terminals and other communications equipment to public packet networks.

The CCITT Study Group VII agreed to the recommendation last month at a meeting in Geneva. The standard will go to the full CCITT for approval later this year.

Using the virtual call, much of the interfacing between terminals and packet-switched nets and between different networks will be standardized.

Telenet Communications Corp. said it will adopt the X-25 proposal for connecting computers to its network. In Canada, the Datapac network being built by the Trans-Canada Telephone System will use its Standard Network Access Protocol (Snap), described as identical to the X-25 proposal.

Set-Up Phase

Using the virtual call interface, a user will go through a call set-up phase similar to dialing a telephone call. This will be done through a "call request packet."

This set-up process will be done logically, using software rather physically or mechanically, such as with a telephone.

After the call request packet has been transmitted and received by the called location, a packet is transmitted back on the network to the calling party which acknowledges that the call has been set up.

From that point on, packets are transmitted and delivered in the order in which they are entered into the network, according to one standards expert.

Minis Seen Giving Net Users Better Protection on Protocols

By Ronald A. Frank
Of the CW Staff

FORT LAUDERDALE, Fla. Data communications users have traditionally employed minicomputers for interfacing with a wide variety of terminal equipment.

This contrasts with the device- and protocol-dependent communications approaches of the mainframe vendors, according to Ed Stucky, marketing director of communication appliances at Modular Computer Systems, Inc. (Modcomp).

The mainframe vendors' communications controllers usually perform character sampling of the data on the line, this approach is usually associated with protocol-dependent line interfaces, Stucky explained in a recent interview.

The mini vendors, however, use "bit bangers" that incorporate bit sampling with no protocol-dependent line interfaces. They can, therefore, talk to many terminals because the protocols is built into the software, he said.

While the bit sampling offers a high degree of flexibility, it also has higher processor overhead, he added.

Because of the various protocol proposals now under consideration, Stucky said, users should be careful about making a commitment to a hardware interface that can only handle one specific protocol.

Fortunately, Synchronous Data Link Control (SDLC), Higher Level Data Link Control (HDLC), and the CCITT's X-25 standard are compatible enough so terms of the basic minimum can be handled at the hardware level, he said. Thus the bit-oriented protocol can be covered with "one genetic type of interface" as long as not too much is put into the hardware interface.

The message content, where the variances between the protocols occur, should be handled on a software level, Stucky suggested.

Implementing this philosophy, Modcomp users can operate with multiple protocols, he said. One risk for the user is that there is a high degree of dependence on the vendor-supplied software.

Despite the flexibility with the software approach, it is not possible for the mini maker to provide support for all terminal types and this is where the user has to decide whether it is feasible to develop in-house communications software.

"Communications networks are getting so large with so much money tied up in them that the user has to treat [a network] as an application" and devote to it the same resources that would be allocated to an order entry or inventory control system, Stucky said.

Eventually a user of Modcomp communications processors will be able to switch from binary synchronous terminals to a packet-switched service and back to a Digital Dataphone-type line. But this concept is not yet possible and covers "a lot of software and a lot of protocols," Stucky said.

This type of flexibility is possible and the goal is to support users all the way through from the start-stop disciplines up to the bit-oriented protocols now emerging, he said.

It is unfortunate that there is so much change within the data communications area, Stucky said, indicating this has come about because the technology has allowed almost anyone to come up with his own protocols.

Any time an attempt is made to optimize an approach for the widest range of users it is rarely the best solution for a specific application, he said.

CW Photo by R. Frank
Ed Stucky

Despite the many new protocols, Stucky believes binary synchronous devices will continue to be supported for many years. "There are still going to be a lot of 360s and 370s out there that are not going to convert upward to SDLC.

"But, despite this, the protocol of the future is a full-duplex protocol which will take better advantage of the communications facilities," he said.

Despite H.R. 12323
Using Specialized Carriers Advised

By John P. Hebert
Of the CW Staff

ATLANTA – "users will be afraid of opting for the specialized data communications carriers because they may drop out" of the communications business as a result of a bill introduced into the U.S. House of Representatives.

That prediction was made here recently by John Stevenson, associate director and vice-president of Triangle Universities Computation Center of North Carolina.

"But these things usually drag on for years, and users may as well get the cheaper service" from these carriers in the meantime, Stevenson said at a Computer Caravan workshop on "Transmission Options."

AT&T is trying to push H.R. 12323 [CW, March 22] to eliminate "duplicate communications services," he said.

Time Limit on Satellites

Another prospect affecting the future of communications is that satellites seem to be growing in popularity. But they might only carry data for another 10 years, Stevenson remarked.

Bell seems to think optical fibers, which have a very wide-band transmission spectrum, will increase traffic rates and wipe out the satellite business in that time, he said.

Stevenson's discussion of transmission options, largely tutorial in nature, also touched on differences in transmission speeds, circuit types, network topology and available carriers.

In the area of transmission speeds available from the phone company, the synchronous spectrum begins at 2,000 bit/sec and terminates at 9,600 bit/sec, he said.

Any speed below that is a asynchronous mode of transmission, and in the 0- to 300 bit sec segment it is a subvoice-grade line speed, he continued.

"The old price rule for transmission speed was $1 per bit sec, but there has been a major break in that rule. I'd rather believe it has been due to competition," he said.

This same competition should lead to improved asynchronous modems in the future and "technological advances in the modem field should lead to much lower costs in the future."

The advantage of a switched network, he said, in addressing the problem of choosing circuit types, is that the user "can dial the circuit and then take it down and less money is spent" if he doesn't need to use the network for a large amount of time.

AT&T's Digital Dataphone Service (DDS) is a truly digital system "if you're close enough to the Bell digital switching center. Otherwise, you might end up with an analog system," he noted.

The advantage of an all-digital network is the low error rate and the fact that a digital system has diagnostic capability built into it, Stevenson said.

"My point of view is that circuits go down more often with an analog network," he added.

Simplest Topology

The simplest form of topology, he said, is the point-to-point multidrop or multipoint network. It has the potential of being the lowest cost course to follow if the dominant cost is mileage, he explained.

But, he added, "that's the good point. Everything else I know is bad."

If a terminal quits responding, the CPU will spend much of its time trying to revive a dead terminal because there is no "automatic adaptation to terminal

(Continued on Page 22)

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Utilizes Hytype II

Diablo Bases Medium-Speed Hyterm Printer on Micro

HAYWARD, Calif. — Diablo Systems, Inc. has introduced the Hyterm, a medium-speed, microprocessor-controlled serial communications printer.

The Hyterm can transmit or receive data from remote or host terminals and takes advantage of the company's Hytype printer, which was given advanced capabilities and redesignated the Hytype II for use with the Hyterm, a company spokesman said.

The Hyterm unit utilizes Ascii code and is compatible with most other data communications devices using this code, he said.

It is capable of printing 94 Ascii-printable characters; the keyboard character set generates all 128 Ascii characters, the vendor said.

The microprocessor is a read-only memory (ROM) that is factory-programmed to perform any sequence of events to handle any coding requirements, according to the firm.

The communications link utilizes Direct Distance Dialing (DDD) telephone lines and a single pair of modems, it said.

The Hyterm is available in either receive-only or keyboard send/receive models which feature conventional or absolute tabbing, adjustable form length and variable format control. The printer has electronic top-of-form feed capabilties said to make the processing of preprinted forms more efficient.

Characteristics include a printing speed of 45 char./sec, 132 or 158 columns and acceptance of 15-in. paper, the company said.

The unit also features a 158-byte character print buffer which allows transmission speds up to 1,200 bit/sec, according to the spokesman, who also said transmission speeds of 110-, 300-, 600- and 1,200 bit/sec are switch-selectable.

The price of a basic Hyterm with the forms tractor, keyboard and power supply is $3,335; a 10-key pad costs an additional $60, the spokesman said from 24500 Industrial Blvd., Hayward, Calif. 94545.

Stevenson Urges Using Carriers

(Continued from Page 21)

downtime," he said.

The bad point about a closed-loop circuit is that it complicates the software because a semiautomated means is needed to bypass a break in the loop, Stevenson noted.

There's "a lot of multiplexing around," Stevenson commented. Frequency division multiplexing is the simplest and least costly and has been around for the longest time, although "I'd like to think that will change.

"The cost of time division multiplexing [TDM] has been and will continue to decrease because of increased microprocessor technology."

TDM is simple, sophisticated and popular because there is a fullness to data coming in at termination points in the network, he said.

The next generation along these lines seems to be toward statistical multiplexers. "But before you go in for a statistical multiplexing system, look carefully before you buy," he advised. "If they lose characters for you, you aren't going to know it."

Another form of multiplexing sometimes overlooked because it is a TDM scheme used through satellites is time division multiple access (TDMA), he noted.

TDMA is not just peculiar to satellites; "the concept is there" and in use such as in the Aloha system at the University of Hawaii. Aloha performs TDMA between mountaintop sending and receiving stations.

Throughputs of about 80% of the theoretical maximum can be achieved with TDMA with a random number generator scheduling the time interval necessary to retransmit if a message is lost due to a simultaneous transmission, Stevenson said.

Expensive protocols aren't necessary with the system and literature on the Aloha is available for users interested in the system, he remarked.

Packaged systems such as Telenet, Tymnet, Arpanet and X-25 (a proposed international packet-switching network), are "sometimes the most economical, especially for large data bases which need a lot of maintenance," he said.

With a packet system within this country, price is not a function of distance because of a distance-insensitive tariff system which is fairly cheap except for leased lines that are frequently used, Stevenson said.

Telenet, for example, charges 60 cents to send a kilopacket of data anywhere the service exists.

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Terminal Transactions

Six-Point Checklist Suggested for Terminal Seekers

By Catherine Arnst
Of the CW Staff

WASHINGTON, D.C. – When searching for a terminal, a user can simplify the process by making a checklist of terminal characteristics and then deciding which ones are most needed for the applications he plans.

That was the suggestion of Samuel Thompkins of the Federal Aviation Administration and Edward McCormick of the U.S. Department of Agriculture, who described the checklist they used to attendees of the Computer Caravan held here recently.

Their checklist is sectioned into six parts: keyboard, display, printer, communications, software and other peripheral support.

Under keyboard, a company should consider how many characters are needed, whether the keyboard should be detachable, whether functions keys – and how many – are necessary, if a numeric pad is needed and what type of keyboard arrangement is desired.

Display Screen

The display screen, usually associated with CRT-type terminals, must next be examined, Thompkins said.

The screen size, number of characters per line, number of lines and the editing features needed must all be considered, they said.

Editing features encompass the specific functions a company wants its CRT to perform, they explained. Available features include split-screen capability, highlighting (mainly used for aesthetic purposes), scrolling, blinking, cursor movements, character and line insert and delete (helpful in correcting errors), tab, numeric check (allowing a given field to be all-numeric), alphabetic check, mandatory field entry, partial transmission, range check, addressable cursor and key rollover, they said.

Another component of the display screen to be decided on is the refresh rate, which helps relieve eyestrain, the speakers said.

It is extremely important that the user tell a vendor how many characters he wants displayed when discussing the printer, they continued.

The checklist for printer characteristics includes the number of printable characters, the print speed, vertical line spacing, horizontal character spacing, type of paper feed and the number of characters per line, they said.

In considering the communications aspect of a terminal, a company must be especially careful to define what data transmission code is desired, Thompkins and McCormick advised.

It is also important to specify to the manufacturer the line speed needed, the communications mode desired, the type of error detection and correction and the transmission mode (simplex, half-duplex or full duplex) required.

The user must also decide and then specify the type of communications network in which the terminal will be used, such as polled multidrop, polled point-to-point or contention and how the terminal will communicate with the [illegible].

In connection with the latter consideration the speakers mentioned IBM's Synchronous Data Link Control (SDLC) which they claimed has put communications protocols "in limbo" at present.

Although it has several advantages, they cautioned that SDLC requires a very large buffer and can be expensive.

Adapter Links Sycor 350s, Teletypes

ANN ARBOR, Mich. – Sycor, Inc., has developed an Interactive Teletype Simulator (ITS) communications adapter for use on its Model 350 terminal.

The adapter allows the Model 350 to communicate with a Teletype, another Model 350 or Model 340 with ITS or a time-sharing computer operating in a compatible environment, Sycor said.

The field-installable adapter allows the Model 350 to transmit the Ascii character set at 75 to 1,200 bit/sec in half duplex, full duplex or full duplex with Echoplex mode, it added.

Local, On-Line

The program operates in local and on-line modes. Local mode is used in maintenance operations, performing activities such as interrogation of files or insertion of special characters into a file in preparation for transmission; the communications line is not connected.

The on-line mode is required for communications and consists of keyboard send/receive and continuous or noncontinuous tape mode.

ITS is part of Sycor's flexible disk library and must be generated by the company's Terminal Application Language (TAL) generator.

The cost of the disk library including ITS is [illegible], Sycor said from 100 Phoenix Drive, Ann Arbor, Mich. 48104.

HP to Lease CRTs for Short Terms

CUPERTINO, Calif. – Hewlett-Packard Co. (HP) will offer its CRT terminals on a short-term lease basis beginning early this summer.

Users may select leases of 6-, 12- or 18 months at charges of 8%, 5.25% and 4.75% of product list prices respectively.

During the lease, HP will provide full weekday service at no additional [illegible].

Monthly [illegible] HP 2640A [illegible] list price of [illegible] 1K memory [illegible] is $145 and [illegible] 18 [illegible].

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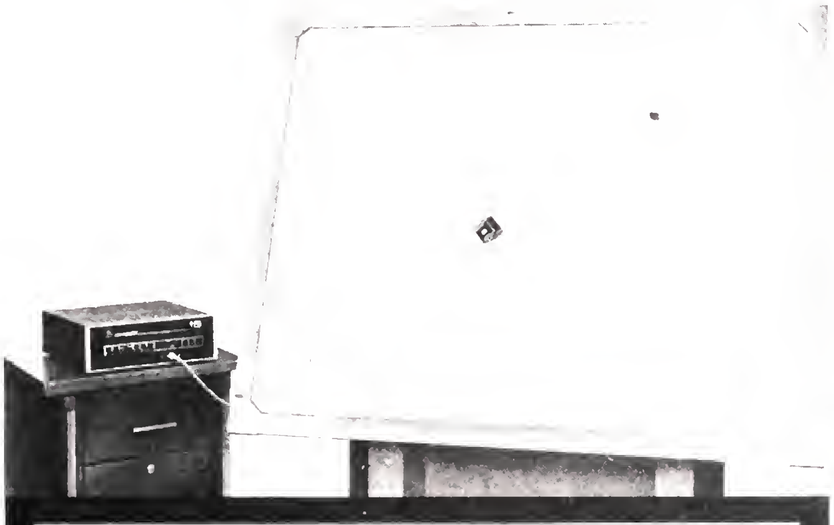

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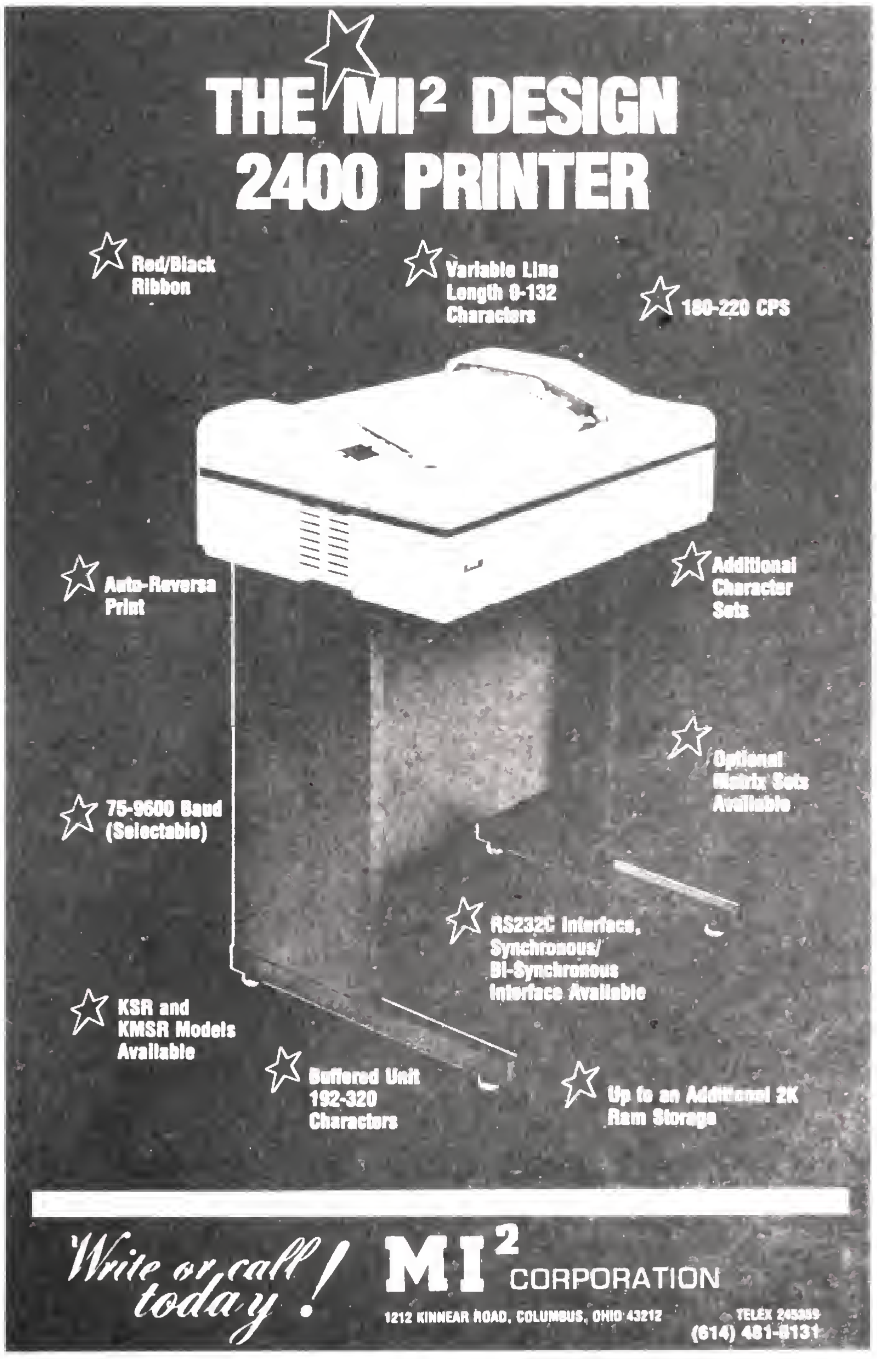
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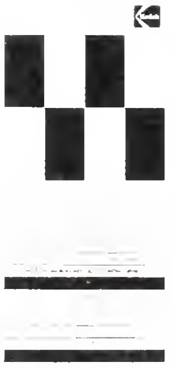

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Two RO Teleprinters Introduced by NCR Run at 120 Char./Sec

ITHACA, N.Y. – NCR Corp. has introduced two read-only (RO) thermal printing terminals designed for parallel and serial interfaces.

The T-77 (parallel) and T-88 (serial) terminals have a print speed of up to 120 char./sec, continuous or conversational, according to the company.

The terminal is entirely electronic and is said to have no moving parts except for the paper advance and print head return mechanism. The dual nonimpact print head utilizes heat to form 5 by 7 dot matrix alphanumeric characters, it said.

Terminal Transactions

Both printers accept transmissions up to 1,200 bit/sec. By adding an optional 4K random-access memory (RAM) buffer, transmissions of up to 9,600 bit/sec can be received, the company said.

Print head position is controlled by optical switches with infrared light-emitting diodes (LED), it said.

Both terminals are Ascii-coded as standard features with other codes available; both are capable of printing either 80- or 132 column/line at 4- or 6 line/in., NCR said.

The T-77 is priced at $2,030 and the T-88 costs $2,414 with quantity discounts beginning at the five-unit level, a spokesman said. The optional RAM buffer is an additional $500, according to NCR's Terminal Systems Division in Ithaca, N.Y. 14850.

DTC Hard-Copy Unit Uses Hytype Printer

CAMPBELL, Calif. – Data Terminals and Communications (DTC) has introduced the DTC-302 Hy-Writer keyboard send/receive (KSR) hard-copy terminal.

Utilizing the Diablo Hytype II printer and a microprocessor controller that is upward-compatible with the earlier DTC-300/S, the 302 offers error checking and terminal interlock features, the vendor said.

Offered in either a desktop model or optional pedestal stand version, the 302 Hy-Writer is capable of print speeds of 45 char./sec, DTC said.

This, together with a buffer optimization and monitor technique, reportedly allows the 302 to operate at optional data rates up to 1,200 bit/sec.

Price of the DTC Hy-Writer is $3,490 with delivery in 15 to 20 days. DTC is located at 1190 Dell Ave., Campbell, Calif. 95008.

IMS/CICS ON-LINE EFT BANK DEPOSIT SYSTEM

DATA BASE SYSTEMS, INC. (DBS) has [illegible] developing a bank data base system (DDS) utilizing the efficiencies of the current [illegible] of IBM IMS/CICS. DDS possess [illegible] batch and on-line capabilities [illegible] Demand and Savings account [illegible]. The most efficient system [illegible] and application design [illegible] for maximum batch [illegible] performance. Being a modular system the multi-bank data bases [illegible] accessed and updated in an independent batch mode or conjunction with additional [illegible] teleprocessing programs, or additional EFT automated terminal program modules may be selected. Primary features of the Data Base Deposit System include:

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NCR Adds Desktop Encoders For Financial Institutions

DAYTON, Ohio – NCR Corp. has introduced a microprocessor-based desktop document encoder and a proof encoder for financial institutions.

The Model 7740 Utility Encoder, a replacement for the NCR 490, provides encoding for all fields on documents in either magnetic ink character recognition (Micr) or optical character recognition (OCR) fonts, NCR said.

The Model 7740 Proof Encoder incorporates a journal printer and four totals, including an adding machine feature, and can also be used as a utility encoder as well as for low-volume proof applications, the vendor said.

Programmable read-only memory reportedly allows the user to specify field formats, type fonts and other variables.

Ampex Extends Memory Family

MARINA DEL REY, Calif. – Ampex Corp. has introduced the third model in its family of microcomputer core memories for terminal, peripheral and microprocessor applications.

The MCM-1814 provides electrically alterable read-only memory (Earom) and random-access memory (RAM) in a single module, the firm said.

Operating in either full-word or full-byte mode, the MCM-1814 offers 400 nsec access to 4K words of up to 18 bits each, Ampex said.

The memory has a write-protect feature which is said to prohibit changing of data in one or more 512-word blocks.

The unit, available now, is priced under $600 in OEM quantities. Ampex can be reached through P.O. Box 33, Marina Del Rey, Calif. 90291.

Unitech Designs NC Tape System

AUSTIN, Texas – The MPS-2000, a tape preparation system for the numerical control (NC) industry, is available from Unitech, Inc.

The device can be used to create, edit, duplicate, verify, transmit and store metalized, aluminized and paper tapes, Unitech said.

A basic MPS-2000 consists of an operating system that handles both Ascii and EIA codes; 125 card/sec reader; 33 card/sec perforator; 30 char./sec keyboard impact printer; interface to telephone company 110- or 300 bit/sec data sets; and 4K bytes of internal Exec operating system program storage.

The basic system is priced at $6,750. Unitech is at 1005 E. St. Elmo Road, Austin, Texas 78745.

For Data Entry System

Firm Finds Users' Advice Key to Success

By a CW Staff Writer

DETROIT – Advice from the system's users played a critical role in the acceptance of a branch data entry system at Federal-Mogul Corp.'s Atlanta warehouse, according to William H. Hendry, supervisor of information systems.

In designing the pilot system for several warehouses, the auto parts manufacturer decided to do all programming at its headquarters and to make each system the same, Hendry said. Atlanta was chosen as the pilot site because it was the median-size warehouse.

Federal-Mogul selected a Four-Phase Systems, Inc. system because it had a Cobol compiler and its shop is a Cobol shop, he recently told a Computer Caravan session here.

One of the secrets of success with such systems is to use the same kind of forms as the manual system, he said.

Federal-Mogul also equipped Atlanta with one more CRT than the number of available telephone lines. "Make sure you don't underequip," Hendry warned.

Another lesson the firm learned was to document the objectives of the system before embarking on it. This avoids having people say, "But I thought it would do . . ."

"Get a user who insists on being responsible for the system," he said.

At Federal-Mogul, the manager of field support operations helped sell the system to the warehouses, he said, as well as find funding. The rest of the company users involved were the Atlanta branch manager and area supervisor and a worker in the warehouse.

Original Plan Scrapped

The original order entry system designed by Federal-Mogul's corporate DP staff was scrapped after it was completed when the Atlanta people looked at it and said it would never work, Hendry recalled.

The original program had asked for all kinds of header information, such as the destination of shipments. But the users said people calling in orders want to list the parts they need without wasting time while the warehouse fills in shipping information.

Also, the implementation of a "menu type" of screen was preferred to the previous scheme of showing only one item at a time on the CRT. The user wanted to be able to review and change the entire screen at a glance.

This capability essentially provides a final check before the order is entered, Hendry noted.

In December 1974, the completed system was rewritten to accommodate these suggestions, and the revised system was installed the following April.

At headquarters in Michigan, Hendry [illegible] the system in a non-air conditioned environment [illegible] Than [illegible] faster the [illegible] 145 [illegible] he encountered no problems.

The purpose of the [illegible] identify what problems [illegible] have [illegible].

The user [illegible] was too long [illegible] time whenever [illegible], he commented.

After installation in Atlanta, the programmers took [illegible] counts, bringing response time to 5 [illegible] instead of 75 sec for an index [illegible] search even with four CRTs on the system, he said.

There was one problem that took three

(Continued on Page 26)

Grumman Printing System Built To Incorporate IBM 1403-N1s

WOODBURY, N.Y. – The Satellite Printing System (SPS) from Grumman Data Systems Corp. is an off-line computer printing system that incorporates IBM 1403-N1 printers.

The SPS was designed for large system users with a heavy print load, a Grumman spokesman said. Such users would include direct mail houses, service bureaus and printing firms.

The system allows the 1403-N1 chain printers to be operated by non-IBM computers, Grumman said. It includes an Interdata 7/16 minicomputer with 65K bytes of memory, which enables the printers to operate independently of the larger system.

The 1403-N1 prints 1,100 line/min and 132 char./line, the spokesman said.

Two, three or four printers can operate simultaneously and independently, depending on the SPS model selected, Grumman said. Up to four jobs can be printed [illegible] or a single [illegible] can be completed [illegible] faster without involving a central data processor, the firm noted.

Teletype Controls System

The SPS is controlled via a Teletype keyboard console which allows the operator to start, suspend, terminate or restart jobs.

An 800- and 1,600 bit/in. tape controller and two, three or four 9-track dual-density, Wango vacuum column tape drives as well as the Grumman printer controllers are contained in the system, the spokesman said.

Options

An optional feature priced at $6,000 enables the SPS to be switched to on-line operation by a Burroughs, Control Data Corp., Data General, Digital Equipment Corp., Digital Scientific Corp., Univac or Xerox system.

The IBM 1403-N1 printer costs $38,140 from IBM, an IBM spokesman said. The firm's Monthly Availability Charge is $983 with fixed-term lease prices available, he noted.

The printers are also available used and refurbished from third parties, the Grumman spokesman said.

The SPS-2, which drives two printers, costs $85,000, the SPS-3, which drives three printers, sells for $110,000 and the SPS-4, which drives four printers, costs $130,000.

Full payout leases are available, the firm said, from 45 Crossways Park Drive, Woodbury, N.Y. 11797.

DS Brings Out Floppy Controller

LIVERMORE, Calif. – Digital Systems (DS) has brought out a floppy disk drive controller for up to four selectable drives.

The Model FDC-1 incorporates a high-speed microprocessor-based design providing functions implemented in read-only memory (ROM) logic, the company said.

Features include drive write-protect, automatic character-recognition code and check, IBM 3740-compatible soft-sector formatting, automatic track/seek verify and head retraction after eight idle disk rotations, according to DS.

The controller is said to be fully total transistor logic (TTL) implemented and compatible. An interface to minicomputer and microprocessor systems, such as the Intel 8080, is provided with 8-bit parallel I/O buses for control information.

FDC-1 prices range from $575 to $1,295 for the controller, floppy disk drive, cabling and driver software. DS is at 754 Carmel Ave., Livermore, Calif. 94550.

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SPECIFIC FONTS
TYPEWRITER PRINTER EMBOSSER

Users' Advice Critical in Data Entry Success

Continued from Page [illegible]

months to locate erroneous drop ship charges were being assessed, which meant certain customers were being billed an extra 7%.

When the system was first installed in Atlanta, it was put in the manager's air-conditioned office, with the CRTs near by.

However, it became evident that if the system was to truly replace the manual system, it has to go out in the middle of the floor "where the action was," he said.

Once the system was moved, it became "one of the boys," he said. By placing it where the workers were accustomed to handling their orders, they used the [illegible], he added.

Some of the workers were reluctant at first, he said, but [illegible] behind the [illegible] when it started working.

Previously the order takers would run down the aisles, check to see if the item in demand was in stock and then take the order. The data entry system eliminates that run and also captures previously unrecorded data on the customer-requested items.

The orders then are sorted according to picking order.

Federal-Mogul had a non-DPer write the user manual. This turned out to be a good idea, Hendry said, because the writer started from the same base as the user — not knowing anything about computerese and how the system worked the way it did and what it could do.

The firm also sold management on the idea the system could be a powerful training tool, he said. To allay any fears about the system, it put some games, such as ping pong, on the system and invited managers to play with it.

"People aren't afraid of a game system in a bar," Hendry observed.

In addition to gathering data that will help forecast demand for parts, the Atlanta warehouse is shipping about 75% more pieces than a year ago with no overtime and the same number of people, he said.

Current inventory data is transmitted at night on a batch basis to headquarters in Southfield, Mich., where an IBM 370/155 runs under Hasp MVT.

Left to their own devices, the Atlanta people have developed what Hendry termed an "incredible" and effective way of handling the alphanumeric part numbers using the keyboard for the left hand and the numeric pad for the right hand.

A Place for Disks

ELM GROVE, Wis. – The Stor-A-Disk Co. has a temporary storing device for flexible disks.

The unit, made of plexiglass, will hold up to 20 diskettes, the vendor said. Two versions are available: the Model 1, a single-pocket unit, and the Model 2, a double-pocket unit.

The Model 1 costs $8.95 and the Model 2 is priced at $12.95. The company can be reached through P.O. Box 406, Elm Grove, Wis. 53122.

CDC Core Module Added for OEMs

MINNEAPOLIS — Control Data Corp. has added a core memory product to its family of modules for small computer and communications OEMs.

The CDC 94300 is said to be plug-compatible with Electronic Memories & Magnetics (EMM) Micromemory 3000 products.

The basic module has 16K 20-bit words, a 650 nsec cycle time and a 250 nsec access time, CDC said.

Units with either 16-bit or 18-bit words are optional, it added, as are rack mounting and power supplies.

Price of the basic unit is $1,340 in small OEM quantities, the vendor said. Deliveries will begin in the second quarter from the firm at 3857 Louisiana Ave., Minneapolis, Minn. 55426.

Mark-Read Feature Added to Univac 1710

BLUE BELL, Pa. — Univac has added a mark-read capability to its Model 1710 Verifying Interpreting Punch (VIP).

It is the first such capability available in a buffered keypunch, according to a company spokesman.

Either 40 or 80 columns of marked data can be accommodated on an 80-column card; up to 12 vertical marks per card column can be recorded, Univac said.

Throughput in the mark-read mode is 40- to [illegible] card/min.

The basic mark-read feature rents for $110/mo, including maintenance. A 1710 VIP with the mark-read feature costs $9,648.

Univac is located at P.O. Box 500, Blue Bell, Pa. 19422.

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600/50, 264MB Disk, 16 Terminals

A NEW Remote

Clients' Stand-Alones Speed Service Bureau's Billing

Special to Computerworld

BRIGHTON, Mass. – A number of small stand-alone systems are helping medical groups and doctors who subscribe to a service bureau here speed up their billing and improve cash flow through better data entry, the user said.

The bureau, which uses an IBM 360 and Inforex data entry terminals in-house as well as the 8K Wang 2200 desktop units, handles direct patient billing, agency billing (such as Blue Shield, Medicare and welfare) and commercial insurance billing.

Manual agency and insurance billing had been the big problem area for many of Guardian Business Service's medical clients, according to Wilbur S. Peck, vice-president of information systems.

"Our clients had been doing their own third-party billing manually, which created a logjam of paperwork," he explained. "It kept getting worse as claim forms became more complicated, resulting in delayed billing and crediting activity and often delaying cash flow."

Late payments were also a problem. Peck estimated that nearly half of a typical medical group's revenues come from Blue Shield payments, but explained that payment from Blue Shield on a manual claim form can take anywhere from two weeks to three months.

Guardian's medical accounts receivable system has cut that turnaround time down to an average of 10 days, since it produces a tape directly compatible with Massachusetts Blue Shield's own computer system, he said.

Traditional claim forms, which normally must be entered manually into the Blue Shield system, are no longer necessary, he added.

Also, Guardian receives a payment tape directly from Blue Shield for each client which is used to automatically credit the client's patient files without manual interface. Guardian anticipates being on a similar tape exchange program with Medicare soon.

In this tape exchange program, the client receives the financial payments directly from the agency, he explained.

Subscribers Lease Systems

The Wang 2200 systems are leased by Guardian's subscribers for about $170/mo. Guardian then charges 35 cents for each agency or insurance claim form and 20 cents each for direct patient bill.

Guardian clients with Wang units in their office have control over their own input, Peck said. The units allow them to enter billing data through predesigned edits for each billing type.

Many of the clerical errors on creating the bills are therefore prevented, resulting in a pure output, Peck said, and eliminating payment rejections due to these types of errors.

It takes a maximum of two days to train a medical group's billing clerk to use the system, according to Peck. The procedure is simplified, he added, since the format on the CRT screen is the same when billing patients, agencies or commercial insurances. The only difference is the type of elements required for each billing category.

Compatible Tape

All of the billing data is keyed into a cassette tape on a Wang unit in the client's office. The number of patients billed in each category (i.e., Blue Shield, Medicare and welfare) are logged at the office and the cassette is mailed to Guardian via mailers provided by the service bureau.

There, the cassette tapes are converted to a 9-track tape format compatible with the 360. The CPU first checks the number of patients in each billing category on the tape against the number the medical group entered in its log.

After ensuring all of the data is in place, the system processes Blue Shield-compatible tape and prints out claim forms for Medicare, welfare, commercial insurances and the private patient, Peck said.

The IBM portion of Guardian's accounts receivable system was written in Cobol, while the front-end processing done by the Wang systems is controlled by programs written in Basic.

"I wanted a Basic language unit, because Basic is an easy language to manipulate," Peck said. "We looked at 15 terminal vendors including Digital Equipment Corp., Sycor and Datapoint. Their hardware was good, but none of them had a software language as flexible as Wang's in conjunction with a terminal that had so many features.

"Also, we had received excellent reports about the durability of Wang's hardware," he added.

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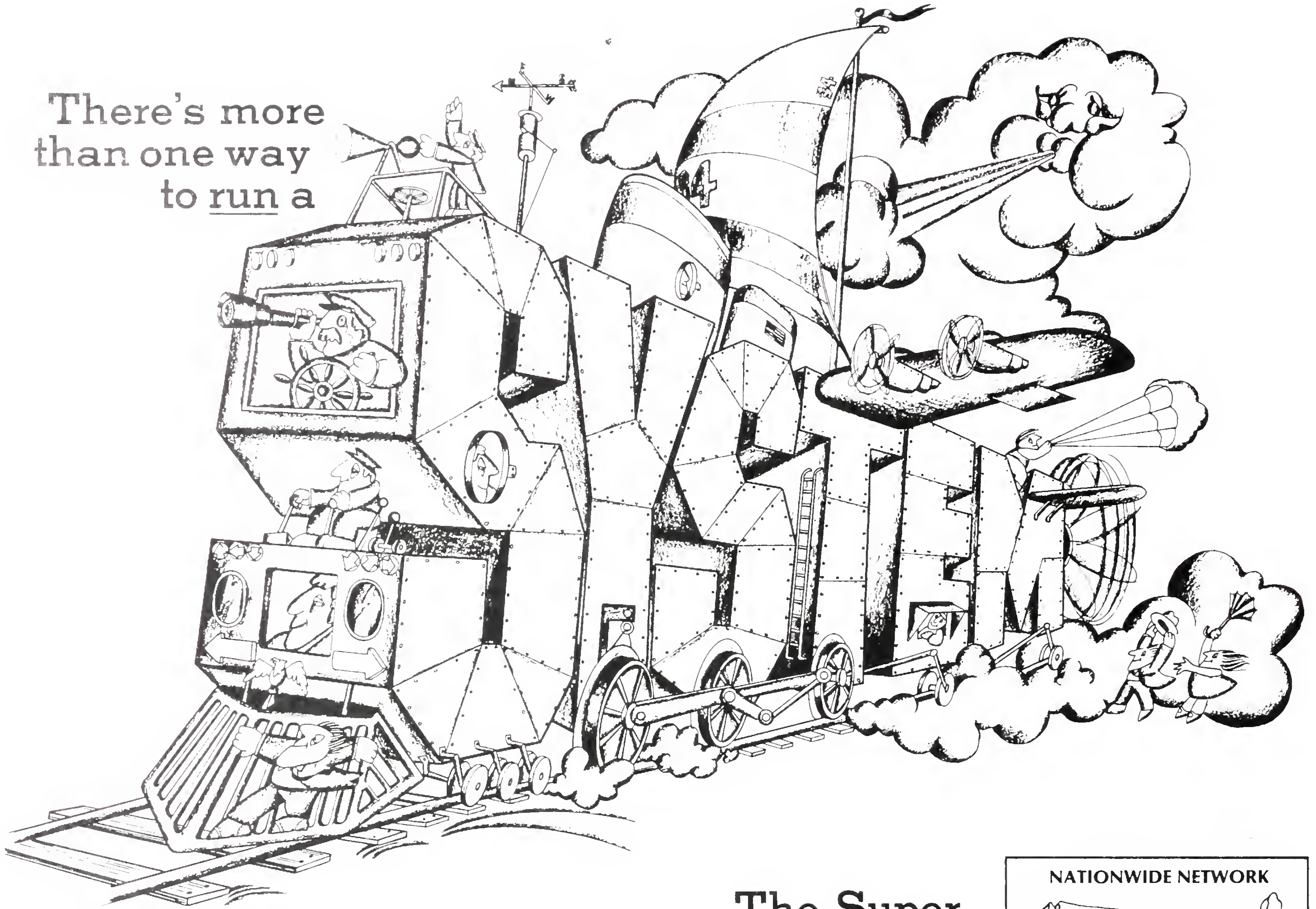

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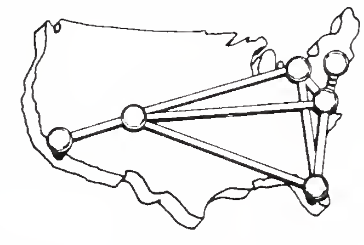

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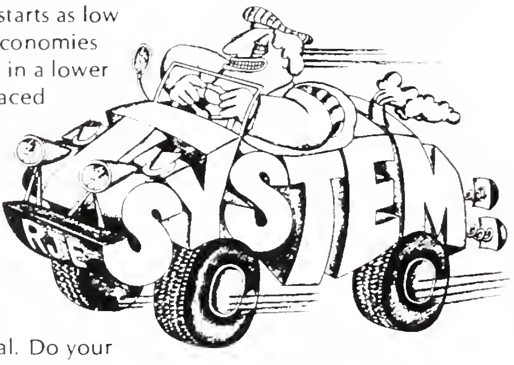

The Technological Umbrella

If you've got something like a 370/135, that makes a fine terminal. Do your routine work on it and channel planned overflow through it to the 168's.

The overflow may be to gain access to an advanced software environment as much as to relieve capacity constraints. For example, you don't have to give up a written-down #360 just to get 15 minutes of IMS per week.

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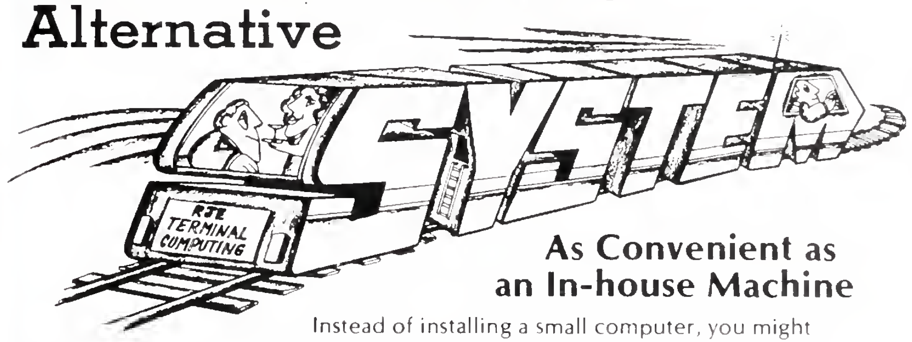
Keeps Your Options Open

There's more: fifty responsive software technicians maintaining and enhancing the system; freedom from juggling your own hardware all the time (to keep up with technology as much as capacity); and the nationwide communications network servicing high and low speed terminals. To top it off: you've kept your options open.

That makes a super supplement to existing facilities.

The Accommodating Alternative



As Convenient as an In-house Machine

Instead of installing a small computer, you might consider one of our Remote Job Entry Terminals as an **alternative.** The cost will be about the same.

You get your own on-site card reader, printer and video displays; and you use the terminal as you would your own machine. But driving the terminal is one of our IBM 370/168's, connected through our nationwide network. That makes a difference.

RJE Terminal Computing gives you virtually unlimited capacity and configuration, powerful programming languages and technical environment and unrestricted access to off-the- shelf business systems software (which isn't often suitable for use on smaller machines).

Plus Business Systems Expertise

This is only the starting point. We believe in the fundamental importance of systems in a company. We help in articulating the impact and potential of computer aided systems. And we provide encouragement and guidance in their design and use.

We'll see that you get the systems you want: when you want. Without the all-or-nothing commitment to computer ownership, you'll avoid congestion and indigestion. Escaping the tyranny of machine amortization, you'll not have to put good money after bad, compromise in the definition of systems or get snarled up in sticky schedules.

We believe that we have another responsibility: that is to make each systems implementation another step in building client-company expertise in data processing. We emphasize— through formal training and on-the-job example— the attitudes and disciplines of successful computer usage: the skills of system design, development, implementation and operation.

Methodology and Tools Included

To get the most mileage out of your resource we make available—at no cost—our proprietary products. Our *Systems Development Methodology* is used by some of the US's largest corporations. The *Master Series Software* system improves the productivity of system designers and programmers (over 100 units are in use worldwide). Over 1500 client staff attended MMDS/Hoskyns Training Courses last year: and our *Modular In-house Training System* is one of the leverage tools available to our RJE clients.

With professional systems expertise and data processing discpline, RJE Terminal Computing is an accommodating alternative to acquiring a computer.

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You may like to consider **replacing** an existing computer with our Networked, Remote Job Entry, Computing Power. Maybe it's a remote, purely operational facility. Or perhaps it's a steady-state, no new development, set-up.

Either way, the cost savings usually run between 10% and 30% of present expenditure. And you get configuration flexibility and network convenience.

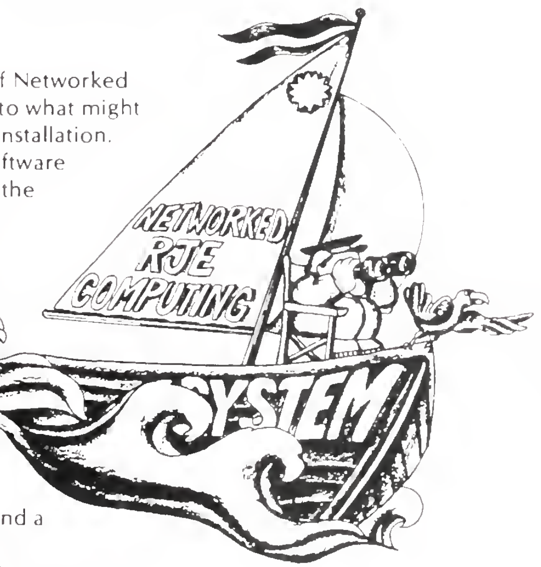
As Much Local Processing as You Need

The terminal might be a small #370, an old #360, or a conventional card reader/ video RJE arrangement. Of course, you run the facility exactly as you would your own computer.

Keep Current

The beauty of Networked RJE Computing is that you put new life into what might have been an under-financed, locked-in installation.

For a start, the central hardware/software environment is constantly advancing. For the steady-state facility—where constrained resource and limited horizons may not always encourage progress—this can be particularly valuable.



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Another possibility for the hard-running data processing department is a mixed approach. 80% of your load may be handled by a basic configuration, straight-forward software and a steady three-shifts per day.

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You aren't locked in to out-of-date hardware or software with this resourceful replacement for in-house facilities.

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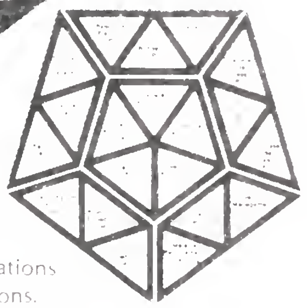

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MAS covers most of the usual business applications with performance proven in over 500 implementations. MAS *fits* better than custom. It's built for tailoring to your exact specification—there's no redundancy. And, being built to flex, MAS continues to fit as your needs develop.

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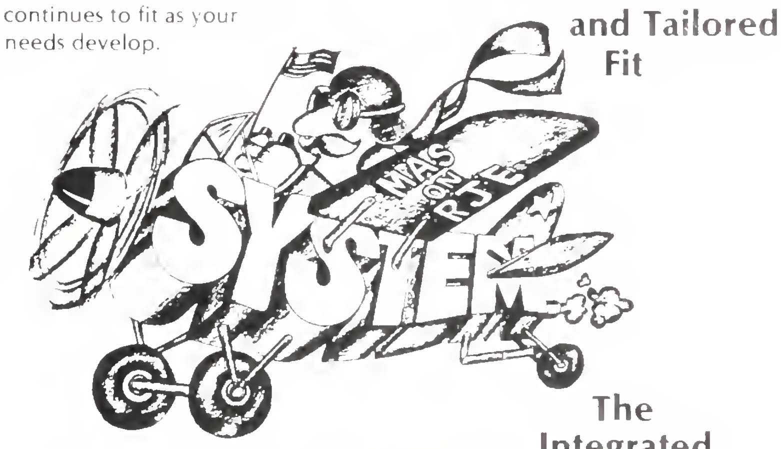

The Integrated System

You take as much or as little of the MAS as you like: an accounts receivable element, say, or a total integrated management system. You implement in more-or-less any sequence, at any pace, knowing the whole system will fit together in the end.

Free RJE Access

MAS *performs* better than custom: 500 implementations have seen to that. The fine-tuning shows in operation and use. Meticulous attention to detail is apparent in the code and documentation.

So, if you're thinking of building a system, we hope that you will look at our MAS modules as a starting point. If you're also short of hardware speed or configuration, or software technology, think of our free MAS on RJE service.

The MAS costs you nothing through the convenient conduit of MMDS's RJE computing service.

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Each one of our Flexydisks is 100% certified, and preformatted for immediate use. Flexydisks have a clean, debris-free surface like our premium computer tape. And if your drive is updated, don't worry; Flexydisks are coated and finished on both sides. Just to be sure.

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Mini Bits

Diablo Adds Three Models To Hytype II Printer Line

HAYWARD, Calif. Diablo Systems, Inc. has added three models to its Hytype II serial printer product line, primarily used as mini peripherals.

The models 1345, 1355 and 1355WP operate at 45-, 55- and 40 char./sec respectively, Diablo said.

Options offered with the series include bottom feed to reduce out-of register printing on multiple-part forms, a split platen to allow side-by-side printing on two different forms and end-of-ribbon and paper-out signals, a spokesman added.

The 1345 is an enhanced version of the firm's 1300 printer introduced last year, the spokesman said. Price on this model has been reduced from $1,800 to $1,300.

The Model 1355 costs $1,460 and the Model 1355WP, for word-processing applications, costs $1,500 from the firm at 24500 Industrial Blvd., Hayward, Calif. 94545.

NCR Cuts Century Prices

DAYTON, Ohio – NCR Corp. has announced a 14% price reduction on the basic Century 101 system which includes a 16K processor, card reader, printer and dual-disk unit.

The system now costs $69,520 compared with the previous $80,520, NCR said. Prices for additional memory have also been reduced, the firm said.

The purchase price of the Century 151 has been reduced by 19%, the firm said. The basic system now provides 64K bytes of memory, compared with the previous systems's 32K, and includes extended addressing and two additional I/O trunks, which had been optional before, NCR noted.

The purchase price of a Century 151, previously $148,450, is now $119,925, the company said from Dayton, Ohio 45479.

HP Adds 18-Pin 4K RAMs

PALO ALTO, Calif. – With the introduction of 18-pin 4K random-access memory (RAM) modules, Hewlett-Packard (HP) systems can contain twice as much memory as they did with earlier 8K modules using 22-pin RAMs, the firm said.

The modules are priced 30% lower, bringing the cost of a 21MX system down 12% to 24%, a spokesman added.

The 18-pin and 22-pin RAMs can be mixed on the system, he noted.

A 16K module now costs $2,100; previously the same amount of memory cost $3,000, the firm said from 1501 Page Mill Road, Palo Alto, Calif. 94304.

First 3/12 User Pleased With System

By Esther Surden
Of the CW Staff

PRINCETON, N.J. – The first user of the IBM 3/12 is pleased with the system's flexibility and responsiveness, according to a spokesman.

The system was installed March 26 at the Princeton University Store here and replaced a 3/10.

The store wanted to upgrade the speed and internal computing power of the system and, at the same time, switch to a cardless environment, according to Charles M. Jones, DP manager for the store.

No other system vendors were considered when the decision to purchase the 3/12 was made, Jones said. The store didn't want to take chances on maintenance or software support, he explained.

"If I got in trouble, I wanted to be able to get at it quickly and have the repairs done and over," he said.

The cardless system is being phased in two parts, Jones said. Presently the firm has a 3/12 processor with the previous card input device and 3340 disk drives.

By the end of the school term, the store expects to have the diskette attachment and the bulk of the data entry done through 3741 workstations.

Handles 80 Agencies

The university store has 16 internal departments and does accounts receivable for some 80 agencies within the university. These include the McCarter Theatre, a university-related repertoire group that performs during the school year.

The store also runs accounting applications for a sculpture group on campus and a medical group, Jones said.

Internally, the 3/12 performs accounts receivable, accounts payable, payroll and general ledger. It also keeps track of the store's inventory of paperback books of which 25,000 titles are in stock.

The book inventory is processed weekly. Titles are added and deleted and, when publishers change this too is noted. After this step is completed, the system runs purchase orders and prints the labels which are attached to the book when it is received, Jones said.

The orders are entered into the accounts payable file for checking when invoices come through. The system also performs for each title a detailed sales analysis which consists of a 12-month history of what was ordered, what was sold and when. The management can then see which sales were seasonal and which were constant throughout the year.

Besides the university trade, Jones said, the store serves the outside community and sells up to 8,000 paperback books a week.

'Keypunch-Intensive' Shop

The system runs 12 hour day and six people are employed in the shop. The shop was described as "keypunch-intensive" by Jones, who said the installation procedures went very smoothly.

"All the pieces were on the floor Friday morning and by 5 p.m. the system was up," he recalled. The first application began running the next morning, he added.

The 3/12 costs about $750/mo less than the 3/10, Jones said, including software and six data modules that run $80/mo each. The total bill from IBM is about $5,200/mo, he said.

"The whole process is going smoothly," Jones said. The IBM support and coordination has been "very fine," he added.

The system has already proved to be flexible and perform faster he continued, and the store expects the remainder of the installation to continue smoothly.

Selecting a Mini – Part 2

RFP Must Be Detailed Document

By Robert E. Berkman
Special to Computerworld

After the user develops the specifications for the business minicomputer system he needs, the next step is soliciting proposals from system suppliers.

There are three types of suppliers: companies that supply hardware only; companies that will develop the software for any selected computer; and companies that supply hardware and software in one package.

The request for proposal (RFP) should tell the vendors what the user wants to know about their company and their systems. The user should plan to spend time with each vendor to answer any questions they have about the RFP, and vendors should be given the specific dates by which they must respond and told when the decision will be made.

The vendor should be asked to supply specific information about the following:

- Company history, financial credentials and references.
- Hardware, both current configuration and expandability.
- System software (operating system, file management systems and utilities).
- Applications software.
- Maintenance (hardware, operating system and applications software).
- Implementation plan; steps and schedule.
- Costs of hardware, software and maintenance.
- Warranties.
- Training.
- Documentation.

In evaluating the hardware components of the system, one must be sure the configuration bid can meet the demands described in the specifications. Based on the transaction volumes, file sizes and printing requirements given, the system must be able to do a day's work in a day.

Printer speed must be such that all the daily printing can be done in a reasonable amount of time. It is best not to have the

(Continued on Page 36)

This is the second article in a five-part series on the selection and evaluation of business minicomputer systems. Next week's article will cover software considerations.

Century 75 Extends NCR Line

DAYTON, Ohio – The Century 75 system gives NCR Corp. users another entry-level alternative to the Century small business computer line, according to a company spokesman.

The system's central processor differs slightly from the firm's larger Century 101 CPU, the spokesman added. The 75 cannot handle multiprogramming or the wide variety of peripheral units available to Century 101 users, he said.

In addition, the 75's memory can be expanded to 64K while the 101 can be expanded to 128K.

The system is field-upgradable to a Century 101, the spokesman added, and operates under the firm's B1 and B2 operating systems.

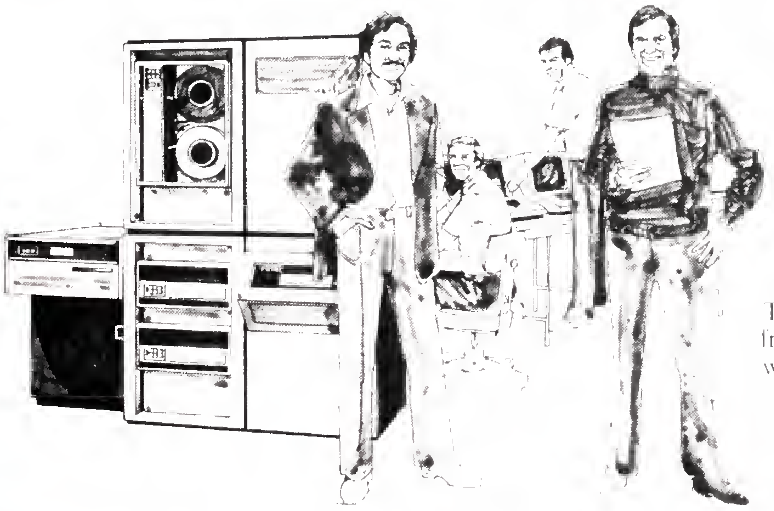
The basic Century 75 includes a 16K CPU, integrated 300 card/min card reader, integrated 200 line/min printer, dual disk memory unit that accommodates 9.8M bytes of storage, a teletypewriter I/O unit and two peripheral trunks, he said.

An I/O interface for a CRT is also included, he noted.

The Century 75 can be used either as a batch or on-line processor, NCR said, and can be expanded on-site to incorporate a 300- or 450 line/min printer, up to 19.6M bytes of disk and an integrated communications multiplexer with a 10-line capacity.

No new peripherals were introduced for the system.

The basic system costs $56,850 with a monthly rental of $1,650 on a five-year agreement, NCR said from Dayton, Ohio 45479.



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PRIME

In Order-Processing Project

Inexperienced Team Implements Mini-Based Network

By Esther Surden

Of the CW Staff

NEW YORK – "At the beginning of the project," none of the four members of the team, including myself, had any experience in programming in a high-level language," James R. Swan, director of information systems for the Battery Products Division at Union Carbide Corp., told a group at a Computer Caravan session here recently.

Swan described the steps his firm took in deciding upon and implementing a communications network using minicomputers.

The firm considered about 50 manufacturers before narrowing the field to four for the systems to be used at the remote sites and in conjunctions with an IBM mainframe at headquarters, Swan said.

The four considered were the IBM System 7, Singer System Ten, Data General Nova and the Burroughs B1700 series.

The systems were benchmarked and the firm decided on a Burroughs B1726. The central site has two IBM 370/165s with a DAT box for virtual storage, he said.

"As of today, all seven field sales office locations are operational with 11 serving warehouses connected by data communications during the day and at night communicating to a central office containing another B1726 at headquarters," Swan explained.

Each sales office has four Burroughs TD 700 CRTs and a slow-speed printer, he told the group. Each warehouse has a TC 3500 that performs the "dual function of handling the communications and printing the summary information of the bill of lading."

The slow-speed printer performs the printing of shipping documents and a TD 700 is used for the entry of shipments.

"The system allows us to enter customer orders with a minimum of variable input. Both product and fixed information is maintained on disk at the sales office. Edits are performed as the operator enters the order," Swan continued.

When the order is completed, it is transmitted to the serving warehouse for picking and shipment to the customer. Inventory and demand records are also maintained in the computer and updated as the order is transmitted to the warehouse, he told the group.

An order status file is created at the time of entry and, when the order is shipped, the warehouse reports the shipment by accessing the order status file, Swan said.

An additional copy of the order is stored on disk at the sales office to be transmitted to the central site in the evening for invoicing. Orders that cannot be shipped from the local serving warehouse become extractions, transmitted to the central site each night, Swan said.

At the central site the orders are accumulated, sorted by warehouse and sent to the sales office that serves the warehouse the following morning, he said.

All transmissions between headquarters and the sales offices are done at night, Swan continued, in an unattended environment at the sales office.

45K Overhead

The data communications overhead is 45K running under Burroughs Network Definition Language (NDL), Swan said.

Information at the central site is written on tape and hand-carried upstairs to the IBM CPU in the computer center, he told the group.

The total savings from the use of the system "would be approximately $700,000 per year." Operating costs will be $350,000/year and the one-time installation cost was $300,000, Swan said.

The four TD 700s, the B1726 mini with 96K, printer and disk pack costs $6,000/mo at each location. The systems at the warehouses cost $1,000/mo, he said.

Pharmacy Turnkey Monitors Patient Prescriptions

BOSTON – A turnkey minicomputer system at Karas Pharmacy here is helping this user deal with an ever-increasing volume of information on patient histories, drugs, doctors and billing parties for the several thousand nursing home patients it serves.

Consultants from Karas Pharmacy regularly visit the nursing homes, advising the administration and staff about possible dangerous medicine combinations and giving educational lectures.

As Karas' business prospered, the amount of paperwork for orders and file maintenance began to strain the staff, taking them away from more important work, according to Martin S. Karas, owner of the pharmacy.

He decided that if business was to continue growing and proper control be maintained, the pharmacy needed a computer system, he said.

Having no previous experience with computer systems, Karas began investigating available systems. There were very few pharmacy systems on the market, he said, and those that were available were too expensive or sophisticated.

Finally, a system being developed by a near-by systems house looked like it might be the answer. System III Computer Corp. had a mini for pharmacies based on the Lockheed Electronics Co., Inc. System III.

Soon after the system's installation, business increased by 600 beds, Karas said. An increase of this size generated substantial dollar volume for the pharmacy, but Karas only had to hire one new pharmacy technician for 30 hours a week.

Orders come into the pharmacy on forms completed by the nursing homes. The average number of orders received at a time from a nursing home is 50 to 100.

A bound order book remains at the nursing home. Each page of the book is numbered and consists of two parts: the nursing home's permanent record and a perforated tear-out sheet which is sent to the pharmacy after the nurse has completed the ordering.

When this form reaches the pharmacy, the computer operator begins processing the order. Using the typewriter terminal keyboard, the operator keys in patient name and number, nursing home name and number, prescription number, drug, drug code, quantity, doctor, doctor number, number of refills allowed, units per day and date of order.

The prescriptions are batch-processed. After all the orders are entered from all the nursing homes, the label printing program is called in. The system prints the labels on three-part pressure sensitive labels, specially designed for use in the pharmacy program.

Drug regime, appearing on the initial prescription order and subsequent refills, indicates the number of days the prescription is supposed to last. When a refill is ordered, a comparison is made between the number of days since the prescription was filled and the actual number of days the prescription was supposed to last.

A patient profile is maintained for each patient which details drugs that the patient is currently on, diagnosis of treatment, any allergies and medicines administered but not necessarily prescribed, such as aspirin, he said.

Recently added to the system is a drug interaction feature. All prescriptions ordered are entered on the patient profile. When a new drug is prescribed, the computer automatically scans the patient profile to check for any possible interaction with other drugs the patient has been on.

The pharmacy system at Karas is small enough to be kept right in the pharmacy, Karas noted. Hardware for the system includes the Lockheed System III with 24K bytes of core memory, keyboard, video display console, 100 char./sec printer and 10M bytes of disk storage. It cost the firm $52,000.

Sykes Has Floppy Kit for OEMs

ROCHESTER, N.Y. – Sykes Datatronics, Inc. has an OEM Floppy System Kit with a hardware interface to connect the system to microcomputers, the firm said.

Also introduced was the Series 9000 addition to the Sykes disk family of floppy disk systems for minicomputers.

The floppy system kit contains a smart disk controller for either IBM-compatible or dual-density formats, up to four disk drives and an interconnecting cable from the controller to the drives.

The kit's microprocessor-based controller is packaged on one PC board and requires less than 1 in. of space.

The micro interface is an 8-bit bidirectional bus with a logical configuration similar to that of a microcomputer memory element, Sykes said. The single-drive kit costs $1,398.

The Series 9000 system offers 2.4 times the data capacity of the firm's 7000 IBM-compatible system.

Microprocessor based and contained on a circuit board, the controller performs searching, data blocking, CRC handling, address verification and head loading.

Hardware interfaces to support the Digital Equipment Corp. PDP-8 and PDP-11, Data General Corp. Nova, Hewlett-Packard HP 2100, Interdata and Varian models are available, Sykes said.

The 9000 costs $2,800 for single-drive systems and $3,900 for dual systems with interfaces costing about $300, the firm said from 375 Orchard St., Rochester, N.Y. 14606.

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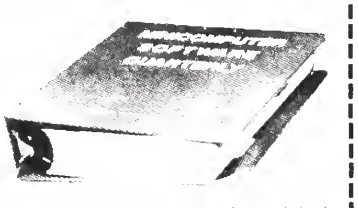

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User-Tailored Turnkey Eases Lab's Billing Procedure

Special to Computerworld

NEWPORT, Calif. – A clinical laboratory here deals with the paperwork associated with medical insurance and billing by using a small business system tailored to its needs.

Approximately 65% of the patients at Newport Professional Clinical Laboratories have some kind of medical insurance, the user said.

The preparation of insurance forms was a major function of the lab's business procedures and consumed much of the working day for a clerical staff of seven, according to Patti Hitchcock, lab administrator.

"We initially used an outside service bureau, but found many errors and very poor response time. We then started using a mechanical accounting machine and multicopy invoices that were neither conducive to efficiency or patient responsiveness.

"We decided we should go into computerization as a way to increase the efficiency of our entire business operation," Kevin Lewand, managing partner, said.

"About a year and a half ago we began to examine the different systems that might fit our particular needs. We decided upon a BSL Northrop Data Systems BDS 1000 because it was designed specifically to meet a lab's requirements."

The turnkey business data system was put into operation in December 1974. It includes a Microdata 1600 CPU with 16K of memory, three CRTs, a 200 line/min printer, a 10M-byte disk and cost $74,000 including software, Northrup said.

Takes Half the Time

We have discovered we can do the same amount of paper work in half the time with three fewer people – that includes insurance form processing, daily billing, account aging and monthly statements. The system has more than paid for itself," Lewand said.

The lab's volume of business has increased "at least 10% to 15% in the past year," Lewand said. "In fact, the decision to computerize was based in part upon our philosophy of growth. We feel our computer system can now handle increases of any forseeable size without the need to hire additional accounting people."

Insurance forms are mailed daily, as are invoices to patients, compared with once-a-month mailings previously employed.

The promptness of billing has had a marked effect on the laboratory's cash flow, Lewand said; delinquencies have dropped by 35% to 40% since the system was installed.

From the accouting supervisor's viewpoint, additional benefits other than processing speed and greater cash flow make the system an important office tool.

"Most of our 'on-demand' calls come from patients who have a question about their bills. Answering their telephone calls and looking up their accounts in a file of 8,000 active accounts was a never-ending chore involving at times five of our people.

"Computerized billing has not only reduced errors substantially, but the invoice itself is easier for the patient to understand and all of the procedures are itemized on a single form. Telephone calls about bills have been reduced to a few calls a week," she said.

Instances of a patient receiving multiple statements have been totally eliminated; all charges are consolidated on a single monthly statement, the lab said.

Although the BDS 1000 was designed primarily as a business data system, Newport Professional Clinical Laboratory has adapted it to perform a unique service for its referring physicians and their patients. The system has been programmed as a by-product of posting the original Pap test results and charges.

A "negative" Pap notice is mailed to the patient at the same time her physician is sent the test result.

Produces Reminders

The system also "remembers" and produces reminders on the six-month and one-year anniversary date from the patient's last report date. The reminders are prepared for each physician to use as he desires, reducing the need for his staff to keep track of their Pap patients and mail them notices.

The system produces reports on test volumes and referring physician statistics that is valuable to the chief technician. The system is also capable of printing lab test results, and the lab is investigating activating this procedure to print legible, professional-looking test reports using fewer typists.

Technologist watches insurance form preparation at lab.

May Symposium Set On Mini Applications

GAITHERSBURG, Md. – The National Bureau of Standards (NBS) and the IEEE Computer Society's (IEEE/CS) Washington chapter will sponsor a symposium entitled "Trends and Applications 1976: Micro and Mini Systems" here May 27.

Minicomputer applications, systems, software and other topics will be covered in parallel sessions in the morning and afternoon, NBS said. A tutorial to review recent developments in mini and micro technology will be given May 26.

The symposium will cost $15 for NBS and IEEE/CS members, $20 for nonmembers and $7.50 for full-time students, NBS said.

A late fee will be charged for registration after May 6. Information is available from Trends and Applications 1976, P.O. Box 125, Columbia, Md. 21045.

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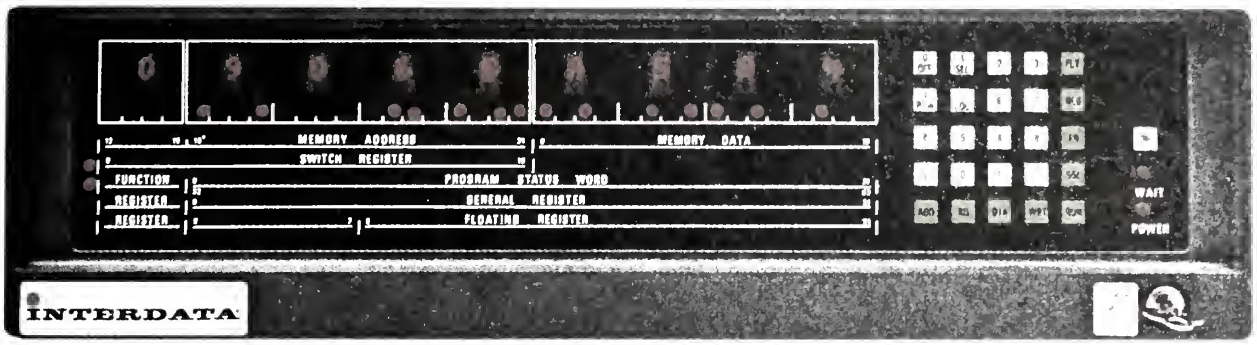

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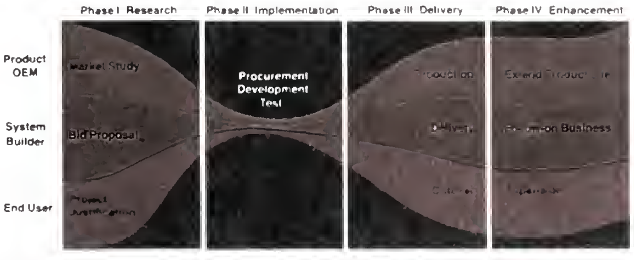

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RFP Should Demand Complete Details From Vendors

(Continued from Page 31)

[illegible] used for an excessive number of hours of printing on a daily basis.

For on-line systems, there must be enough disk capacity to have the required files available for immediate access. In business applications, it is generally not necessary to have all files on-line simultaneously. The specifications will detail what files need to be on-line.

CRT Response Times

With the use of CRTs, the user must be conscious of response times. Depending upon the application, response times should not exceed 3 sec.

On some computers, response times tend to degrade as one adds more CRTs. The best way for a user to validate response times is to have the vendor take him to a location that is processing applications similar to his.

In addition, the user should find out if there are any times when his CRTs are locked out. With some systems, a CRT is used to control the printer and cannot be used for any other function while printing is taking place.

On other systems, all CRTs are locked out when printing is in progress. Depending on the workload, this may not be critical, but one should be aware of it.

Manufacturers often offer their first system or new models. A computer system requires time to reach a level of stability, so a sufficient number of models should be in the field to provide the manufacturer with a wide range of experiences and problems.

The computer system chosen initially will be the minimal configuration to meet immediate needs and to account for short-term growth. It should have the ability to expand to meet long-term (at least five years) growth requirements.

The expansion capacity should be available today – out in the field and working. Promises of future announcements or research and development should not be considered.

Sometimes expansion capability is offered by means of switching to another product line. One must examine this situation with some care.

If the user had purchased his system, he will want to know if the conversion to the new model can be achieved with a field modification to the current system or if he will have to buy a new system and sell his old one.

He will also want to know if his programs will be compatible on the new computer. If the new system requires a total rewriting of the existing software, those costs and time factors must be considered in the evaluation.

The cost of system expansion should be examined because these costs are not always on a one-to-one relationship. For example, the cost of adding another module of disk may involve more than the cost of that disk. Certain increments of disk capacity may require additional controllers or more main memory.

Finally, a computer system that is still viable, not one that is being phased out by the manufacturer, should be selected.

A product line with a high activity of new announcements is generally one that has not yet reached its peak and is a viable long-term product line.

Berkman is president of Robert E. Berkman Associates, a Ridgewood, N.J. consulting firm specializing in the selection and installation of small business systems.

Portable Storage Unit Designed for Testing

CAMBRIDGE, Mass. – Aimed at the OEM with dedicated minicomputers that have to be occasionally loaded with new programs for upgrading and the inevitable core "wipeouts" that happen, the ACT-1200 from Digital Laboratories is a portable storage unit.

The unit was designed for field testing and program loading of small computers. It plugs into any mini's or terminal's standard serial asynchronous port, the firm said.

The ACT-1200 can record and play back at rates up to 1,200 bit/sec.

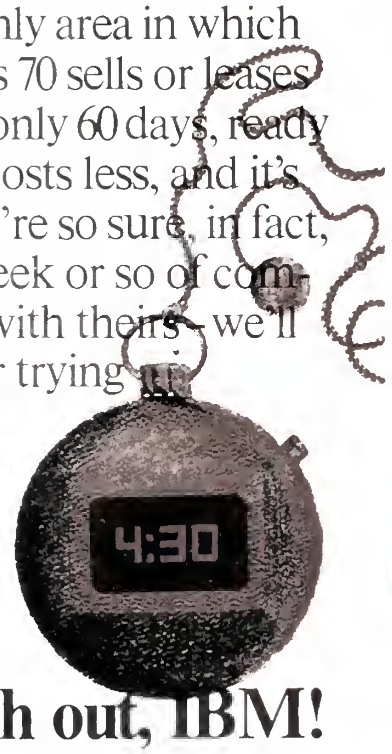
The unit costs $975 from the firm at 377 Putnam Ave., Cambridge, Mass. 02139.

UK Company Adds Family Of Cartridge Disk Drives

MIDDLESEX, England – Data Recording Instrument Co. (DRI) here has introduced the Series 3200 family of cartridge disk drives for minicomputers.

The Model 3206/08 has a 6M-byte disk capacity and 1.5 mHz transfer rate while the Model 3212 has a 12M-byte capacity and a 3 mHz transfer rate, the firm said.

The drives utilize what DRI termed an "exclusive head positioning technique," dubbed "fingerprinting," and incorporated a read-only memory. Information is available from the firm at Hawthorne Road, Staines, Middlesex TW183BJ, England.



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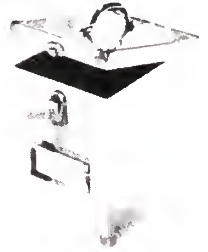

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CI Notes

Semi Shipments Drop 18%

PALO ALTO, Calif. – Worldwide shipments of semiconductors by U.S.-based manufacturers declined by almost $600 million in 1975, a drop of about 18.5% from 1974 totals, according to a report from the Western Electronic Manufacturers Association (Wema).

Semiconductor sales last year were just over $2.6 billion compared with $3.2 billion in 1974 and $2.7 billion in 1973, Wema said.

Shipments to all domestic customers dropped 18.2% to $1.7 billion in 1975, but the drop was even greater in the major foreign markets for U.S. semiconductors, according to the report.

Shipments to Western Europe were off 20.7% to $630 million in 1975, while the Japanese market dipped 21.2% to $102 million in 1975.

Shipments of discrete devices dropped 19.6% to $1.1 billion in 1975 and monolithic semiconductors incurred a smaller percentage decline, 17.5%, to $1.4 billion in 1975, according to the association.

CDC Staking 100% in Nippon Firm

TOKYO – Control Data Corp. plans to acquire 100% of CDC Japan Ltd.

Its partner, C. Itoh & Co., has agreed to sell its 50% interest to CDC. The agreement is subject to approval by the Japanese government.

Supershorts

Saztec Ltd. has been named the Australian distributor for Genesis One Product Corp.'s G77 terminal.

– –

Basic/Four International has selected Atkins Carlyle Ltd. as its distributor in Australia.

– –

Pertec Corp. has concluded the acquisition of Computer Machinery Corp.

–

CSS International has agreed to distribute Mitrol, Inc.'s Mims manufacturing control system in Europe.

– – –

A group of employees has purchased the Iomec, Inc.'s Customer Engineering Division from Data 100 Corp. ICF, Inc. is the name of the new firm.

– –

Courier Terminals Inc. has licensed Volker-Craig Ltd. of Canada to manufacture its Model C270 CRT terminal. Courier Terminals Ltd. will market and service the units in that country.

–

Over 1,000 terminals were shipped in February by the Data Products Group of Lear Siegler, Inc.'s Electronic Instrumentation Division.

Aid Balance of Trade

U.S. Exports of DP Goods Rise in '75

By a CW Staff Writer

WASHINGTON, D.C. – U.S. exports of computers and related equipment continued to rise during 1975, posting a favorable balance of trade, according to the U.S. Department of Commerce.

With exports valued at $2.23 billion, up 1.3%, the computer equipment category was the only one of four trade categories in the business machines classification that showed a favorable balance of trade for the year, Commerce said.

Computers helped the general business machines category show a positive trade balance of $1.65 million for the year, down 4.1% from $1.7 million in 1974.

Computers and related equipment made up the largest trade category and accounted for 84.1% of total U.S. business machines exports during the year, the report said.

But the category of computers and related equipment also showed the largest relative increase in imports in the business equipment sector for the year, up 11.6% to $128.5 million, Commerce said.

However, it remained the smallest import category, accounting for 13% of office equipment imports.

Canada was the principal customer for computers and related equipment, purchasing exports valued at $320.1 million. West Germany bought $270.3 million followed by France $223.2 million, and Japan with $189.3 million.

The Far East, excluding Australia, New Zealand, India and Pakistan, spent $271.2 million on U.S. equipment. Latin America acquired $161.3 million of DP-type equipment while the Near East, including North Africa, Israel, Iran and the Arab countries, bought $44.2 million.

The Eastern Bloc purchased $39.4 million worth of machines. Commerce said the Eastern Bloc includes Mongolia, China, North Vietnam, North Korea and Cuba.

DP imports came principally from the European Economic Community ($60 million) and Canada ($62.2 million), according to the Commerce figures.

In other categories of equipment, the drop in exports of calculating and accounting machines, 22.8% to $261.1 million, and typewriters and parts, 16.5% to $77.2 million, were largely responsible for the overall decline in exports, Commerce said.

The European Economic Community bought $1.2 million of business machines from the U.S. down 2.9% from 1974. The Far East bought $312.2 million in business machines, a decline of 18.6% from a year ago.

Exports of business machines to Latin America rose to $251.7 million, up 3.3%, while the Near East jumped 33% to $50 million and the socialist countries' consumption soared to $41.1 million, up 55.7%, Commerce said.

Canada's Installed Base Up 26.7% In '75, But IBM Lead Dwindles

By Toni Wiseman

Of the CW Staff

TORONTO – Canada's installed base of computers increased by 26.7% to 4,940 in the year ended May 1, 1975, up from 3,899 in the year-ago period, according to the annual computer census published by the Canadian Information Processing Society (Cips).

While IBM dominated the market with 32% of the installed base in terms of units and 56% in terms of value, its market share slipped from that of the year-ago period, when it held 39% of the installed base and accounted for 60% of value.

In 1975, IBM Canada had 1,583 units while Digital Equipment Corp., the next largest supplier, had 665 computers installed.

These two mainframers were followed by Honeywell (482 installed), Univac (418), NCR Canada (264), Hewlett-Packard Co. (180) and Burroughs Corp. (169).

By value, however, Univac followed IBM with 10.5% of the market, down from 13.5% in the year-ago period, and Honeywell accounted for 8.6%, up from 7.6%. Burroughs was fourth with 4.8% of the market value.

While DEC was second in terms of units installed, it ranked only fifth in terms of value because virtually all of its units rent for under $5,000/mo.

Almost half of Canada's computers (2,400 out of 4,940) are located in Ontario. Quebec has 1,035 units, or 20.9% of the installed base, and British Columbia has 458, Alberta 439 and Manitoba 200.

Manufacturing industries were the leaders in computer installations in Canada, accounting for 1,175 machines or 23.8%. Service industries, excluding financial institutions, accounted for 664 computers, or 13.4% of the installed base, followed by government (592), wholesalers and retailers (508), service bureaus (462), financial institutions (327) and utilities (282).

The segment using the most machines with rental between $1,000 and $2,000 was manufacturing, which had 407 such units, followed by "other services," with 312 and government with 203. The distribution sector had 180 such machines.

On the other side of the scale, the machines that rented for $50,000 mo and

(Continued on Page 38)

But Advocate Control

Vendors Mixed on User Groups

By Don Leavitt

Of the CW Staff

ATLANTA – "One rotten apple can affect the whole group," Linda Garner of Management Science America warned here recently. But, she added later, "properly controlled and properly motivated" user groups can be of value to software vendors.

Speaking at the meeting of the Association of Data Processing Service Organizations (Adapso), Garner said loss of control over a product's development is one of the risks of having a user group.

Loss of revenue is another risk if the users happen to share their complaints rather than their enthusiasm for the vendor's products. But there are ways to control such risks, she added, and other panelists agreed.

Richard Thatcher, president of Atlantic Software, saw user meetings as "almost entirely positive." His company encourages suggestions from users but, he admitted, "we base our plans more on what the competition is offering and why potential users picked their product instead of ours."

Panelist John Postley, a division president at Informatics, Inc., said the Mark IV users group – the IV League – includes an evaluation committee. This task group is helpful in setting priorities for product enhancements, he explained, even though the enhancements themselves are not ideas that are new to the vendor.

President Ken Kirchman of Florida Software Services said his firm just held its second annual users meeting and he is very much in favor of them.

However, he warned his fellow vendors against having too many technical support people at the meetings" because "they bog down the tempo of the meeting."

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HP Takes New Tack by Choosing to Lease Own CRTs

By Molly Upton
Of the CW Staff

NEWTON, Mass. — Hewlett-Packard Co. (HP) is implementing a short-term lease plan for its 2640A and 2644A CRT terminals (see story on Page 23) and has restructured its discount scheme "to better reflect the market we're in," according to Ed Hayes, marketing manager for the Data Terminal Division.

Many large firms procure terminals on lease plans, Hayes said in an interview because leasing allows them to conserve cash, evaluate the units before buying and to update on fairly short notice.

HP elected to handle its own lease paper in order to retain control over its reputation, he said. Several other terminal makers sell units to distributors who then make them available on lease plans, he observed.

Effective April 1, the firm switched from its "six-pack" plan, which allowed a 12% discount on six units, to an 8% discount on five units.

Under the previous plan, there were no discounts on options or accessories. These are discounted under the new plan, he said.

HP also now offers discount breaks for 10, 20, 50 and 100 units. Previously the next break after six was 75.

The new plan "better reflects the competitive situation and volumes," Hayes said.

The same discount available on the terminals also applies to accessories, options or subsystems such as printers, he said.

Since the introduction of the 2640A 18 months ago, HP has shipped over 5,000 CRT terminals, he said. About 80% of the base is the 2640A, but over the years this should break down to about 60% of 2640As and 40% of 2644As, he said.

Current shipments are running close to the 60-40 ratio, he said.

The principal markets for the terminals are in manufacturing; unit production; education and universities; government; and finance, he said. The terminals are used primarily for data entry and retrieval and program developments, he added.

The majority of these sites already had HP equipment, he said, adding "there is no question we benefit from the HP name and sales force."

But the division wants to be a "major force" in the terminal market, Hayes said, and the terminals are also enabling HP to gain entrance to other sites.

Plans 3270 Type

HP intends to come out with a terminal that is communications-compatible with the IBM 3270 but not a plug replacement, Hayes said.

Such a terminal would be appropriate for IBM sites where applications programming is done in-house, he observed.

The next logical step will be a product that offers higher speed (9,600 bit/sec); increased communications capabilities such as polling and multidrop; 3270 compatibility; and more editing features, he said.

The division intends to offer a complete product line, and "one would expect to see sometime in the future a low-cost terminal as well as those with more features such as graphics, user programmability and more storage," Hayes said.

More Character Sets Coming

HP also will increase the number of character sets available, he said. Currently it offers English, Katakana and Cyrillic. Offering foreign language capability on terminals "gives us a tremendous advantage for our CPUs," he commented.

The line-drawing set option is "very popular," he added, although its availability was delayed initially.

The set uses a 9K read-only memory and the yields were lower than expected from the supplier, he said. The ability to draw lines and make forms on the screen stresses the terminals' emphasis on data entry and retrieval, he said.

HP has also brought out a data communications card option for $200 that enables the terminal to offer switch-selectable speeds from 37.5 bit/sec to 2,400 bit/sec, split bit/sec rate, current loop and RS-232.

Four Scientists Gain IBM Fellow Honors

NEW YORK — IBM has named four scientists as IBM Fellows for their technical contributions to the company.

The IBM Fellows will have an opportunity to pursue technical projects of their own choice for the next five years, IBM said.

The new fellows are:

Dr. Edgar F. Codd, who has pioneered work in the organization of large computer data bases.

James H. Pomerene, who directed IBM's Harvest program, which was a major addition to the IBM Stretch computer for the U.S. government two decades ago, and is known for his work in storage hierarchy development. Pomerene also had a major role in developing the advanced buffer memory system for the 360/85.

Carl A. Queener, who has been involved in the development of IBM typewriters, magnetic media products and copying machines.

Dr. Heinz Zemanek, who, before joining IBM in 1961, built one of the first transistorized computers in Europe and won acclaim for the "Vienna Definition Language," a powerful and scientifically exact programming tool, according to IBM.

Canada System Base Rises 26.7% in 1975

(Continued from Page 37)

over were concentrated principally in four sectors. Government led the way with 51 large systems, followed by service bureaus with 45, financial with 32 and transportation, 19.

The census excluded computers with rentals of less than $1,000/mo. These machines accounted for some 43% of the 5,736 computers listed in the 1973 census, according to Cips, which hopes to conduct a separate survey of minicomputers.

The largest number of computers in the survey had monthly rentals of between $1,000 and $1,999 (1,710 systems) and between $2,000 and $4,999 (1,664). Only 217 machines rented for $50,000 or more, Cips said.

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How will privacy legislation impact your computer operations?

Attend the one-day DPMA Executive Seminar June 1, 1976, at the Hyatt Regency O'Hare in Chicago.

Four states have already passed laws covering state agencies. Such legislation is patterned after the Privacy Act of 1974 covering Federal agencies. But H.R. 1984 proposes to cover the private sector.

Purpose of Seminar

The objective is to provide computer management personnel in the private sector with an understanding of the problems encountered by the Federal agencies in complying with the Privacy Act of 1974.

Panel Participants

Panel members will be:

- Carole W. Parsons, executive director, Federal Privacy Protection Study Commission, Washington, D.C.
- Philip A. D. Schneider, associate director, Manpower Information, U.S. Civil Service Commission, Washington, D.C.
- Walter W. Haase, deputy associate director, Information Systems, Executive Office of the President, Office of Management and the Budget, Washington, D.C.
- Robert Blanc, Institute for Computer Sciences and Technology, National Bureau of Standards, U.S. Department of Commerce, Washington, D.C.
- Edward B. Messerly, regional commissioner, Automated Data Processing and Telecommunications, General Services Administration, Chicago, Illinois.
- Timothy H. Ingram, staff director, Government Information and Individual Rights Subcommittee of the Committee on Government Operations of the U.S. House.
- Edward J. Brennan, Jr., vice president and general manager, TRW Information Services Division, Long Beach, Cal.

Panel moderator will be William A. Fenwick, partner in the law firm of Davis, Stafford, Kellman & Fenwick, Palo Alto, Cal. He is chairman of the American Bar Association's Committee on Law Relating to Computers and has been working on the privacy issue for more than three years.

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Views of the government officials will enable you to anticipate the effects of proposed privacy legislation in your state. It will help minimize problems and costs in complying with such laws when they are enacted. Because the law is specific and complicated, you need all the help you can get. Come and learn from the experts. They have answers based on their experiences as the nation's largest users of computers!

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Outright Purchases Prove Factor In IBM Quarter Net Rise of 24%

ARMONK, N.Y. – IBM's first-quarter earnings soared 24.5% on a 16.6% gain in revenues compared with the year-ago period.

Both earnings and revenues topped those of every 1975 quarter except the fourth one.

However, Chairman Frank T. Cary warned the "quarter-to-quarter increases in outright purchases experienced in 1975 are not expected to continue in 1976.

"Therefore, year-to-year comparisons in gross income and net earnings throughout the remainder of 1976 are unlikely to be as favorable as those in the current quarter."

During the first quarter, "outright purchases of DP equipment, while well below 1975's record fourth quarter, continued at a high level and substantially exceeded the relatively low level of last year's first quarter," he observed.

Earnings totaled nearly $544.4 million or $3.63 a share compared with $437.2 million or $2.95 a share in the year-ago quarter.

Revenues rose to $3.81 billion compared with $3.27 billion in the same 1975 quarter.

Revenues from rentals and services increased 6.4% to nearly $2.53 billion compared with almost $2.38 billion in the year-ago period.

Sales rose to almost $1.29 billion compared with $896.9 million in the 1975 first quarter.

Other income also rose, to $107 million compared with nearly $92.2 million a year ago.

"Incoming orders for DP equipment increased significantly over the comparable quarter of 1975, reflecting the general improvement in the economic climate," Cary said.

"Shipments of DP equipment also compared favorably with 1975's first quarter," he added.

34 Sessions Planned For IEEE Electro/76 In Boston May 11-14

BOSTON – The 34-session program at Electro/76 will emphasize microprocessors, microcomputers and communications.

The Institute of Electrical and Electronics Engineers' (IEEE) four-day International Convention at the Hynes Auditorium and Sheraton-Boston Hotel here will be held May 11-14.

Dr. C. Lester Hogan, vice-chairman of Fairchild Camera and Instrument Corp., will deliver the keynote address Tuesday morning. His talk will be entitled "A Solid State of Progress: 1948 to 1984."

With five concurrent sessions each day, the program will cover topics ranging from communications and advances in display devices to production research and technology.

The sessions on micros will include "Microprocessors: The Future Is Now," "Design Aids for Microprocessors," "Applications," "Testing," "High-Level Languages" and "Designing and Debugging Micro-based Systems."

Communications will be the topic of several sessions including "Trends in Communications Components," "Computer Communication Networks" and "Trends in Communications Equipment."

Still other sessions will look at engineering management techniques, computer technology assessment, computer-assisted design, crime and computers and new memory technology.

Papers in this latter session will examine the impact and momentum of semiconductor, magnetic bubble, and electron beam memories, progress in memory and storage technologies and impact of large and fast memories on system architecture.

The exhibit floor, with displays from 260 vendors, will be open daily at 10 a.m. until 6 p.m. on Tuesday and Thursday, until 9 p.m. on Wednesday and until 4 p.m. on Friday at the Hynes Auditorium.

Registration for the exhibit and program events is $6 for IEEE members and $9 for nonmembers.

The show is being sponsored by Region 1, Central New England Council and the N.Y. City area sections of the IEEE and the New England and New York chapters of the Electronics Representatives Association.

For further information or advance registration, write Electro/76, 999 N. Sepulveda Blvd., El Segundo, Calif. 90245.

Orders & Installations

Indiana University has ordered more than 100 Sycor 250 intelligent display stations to replace and expand its network of IBM 3270 terminals.

T.E. Ibberson Co. of Minneapolis has ordered a Burroughs B700 for use in payroll and related jobs, job cost analysis, material and equipment cost analysis and insurance reports.

Perl Mack Enterprises, a real estate and development company in Denver, has ordered a Univac 90/30 system for use in property management of apartments, shopping centers and office buildings and construction management and accounting.

Text II electronic publishing systems from System Development Corp. have been ordered by two Florida newspapers, *The Lakeland Ledger* and *The Gainesville Sun*.

General Die Casting Co. of Oak Park, Mich., has ordered a Burroughs B700 for payroll.

Potlatch Corp. Consumer Product Division has ordered a Measurex Corp. System 2000 to control napkin and towel production.

Perma Management Services Co. has installed a Burroughs B1700 for accounting and bookkeeping services that the service bureau provides.

Pittsburgh Brewing Co. has ordered a Univac 90/30.

Agency Records Control Inc. of Houston, a subsidiary of Kinch Services, Inc., has installed Modem 96 Multimode units from International Communications Corp. to upgrade its data communications system.

The *Silent 700* ASR Data Terminal. It shares time with good company.

The twin-cassette *Silent 700** Model 733 ASR data terminal from Texas Instruments is supported by every leading U.S. timesharing service company, a few of which are indicated here.

What's more, it's a powerful alternative to conventional teletypewriters. It's quiet. It transmits and prints data at 30 characters per second. And it reduces connect time and user cost.

Programs are prepared off-line and stored on cassettes, avoiding expensive connect time during data preparation. Result: More users can access the system without loss in response time. More computing time is delivered for the dollars spent.

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User programs are stored on cassette locally, reducing the cost of disc file storage at the remote computer.

The Model 733 ASR lists for $2895*, including printer and twin cassettes. Attractive lease rates are available. And it is backed by worldwide TI service and support.

For more information, contact your nearest TI office. Or write Texas Instruments Incorporated, P.O. Box 1444, M/S 784, Houston, Texas 77001. Or call 713/494-5115, extension 2124.

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New Companies

IRVINE, Calif. — Business Systems Advisers, Inc. (BSA) has been formed to offer services to end users and suppliers of small business computer systems and related peripherals.

Al Cosentino is president. BSA is at 18872 MacArthur Blvd., Suite 250, Irvine, Calif. 92715.

BURLINGTON, Mass. — The Computer Store, Inc. has been formed here to sell mini and microcomputer systems "over the counter." The firm also stocks paper and magnetic media, technical books, instruments and logic and memory chips and boards. It is located at 120 Cambridge St., Burlington, Mass. 01803.

BALTIMORE, Md. — Columbia Data Products, Inc. is manufacturing a recorder for the 3M Co. Data Cartridge system. It is offering the unit on both the OEM and end-user basis. The firm is at 6655 Amberton Drive, Baltimore, Md. 21227.

German Show To Spot Minis

FRANKFURT, Germany — An exhibit of U.S. minicomputers and microcomputers will be held here Oct. 12-15 at the U.S. Trade Center under the auspices of the Commerce Department's Bureau of International Commerce.

The German microcomputer market alone is expected to grow from $10.5 million this year to $70 million in 1980, according to Commerce.

Vendors interested in participating in the exhibit should contact the Bureau of International Commerce, U.S. Department of Commerce, Washington, D.C. 20230.

OSC Files Bankruptcy After Credit Refused

NEWTOWN, Pa. — Optical Scanning Corp. (OSC) filed Chapter XI bankruptcy after its principal creditor refused to extend additional credit.

The court has appointed a receiver and the company is in reorganization, according to Donald P. Dennis, treasurer.

The firm is still operating, and Dennis said business is very good.

Principal Unpaid

OSC failed to pay $500,000 principal of its 9% convertible senior note due Dec. 18 or $216,640 in semiannual interest installment on its 8% convertible subordinated debentures.

During the first quarter ended in September, a $1.1 million special credit from the repurchase of convertible debentures and tax credits helped the firm show earnings of $243,453 compared with a loss of $64,584 for the same period last year.

Revenues dropped to $4.2 million compared with $4.4 million a year ago.

Harris Wins 'E' Award

CLEVELAND — The Harris Corp. has received the President's "E" Award for excellence in exporting.

Harris has increased its exports 260% during the past five yeras, from less than $25 million annually to $90 million this year, the firm said.

To qualify for an "E" Award, a manufacturer must show a substantial increase in exports over a three-year period. The company also should demonstrate breakthroughs in especially competitive markets, introduction of a product into U.S. export trade or the opening of new markets.

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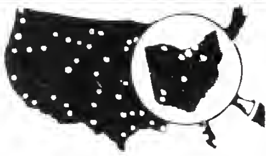

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position announcements

SYSTEMS SPECIALIST (SENIOR)

Advanced Educational System, currently being implemented on Burroughs large scale computers, requires talents of experienced Systems Specialist. Minimum of five years computer experience, at least two on B6700. Compensation dependent on qualifications and experience. Please send resume and salary history to Mr. Steve Wilder, MECC-MIS, 1925 West County Road, B-2, St. Paul, Minn. 55113. Application deadline, April 28th, 1976.

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PROGRAMMER/ANALYST

Immediate openings for experienced programmer/analysts with large midwest multi-vendor data center. Applicants should have minimum two years experience in NEAT/3, ANS/COBOL or assembler language. Background in financial or manufacturing applications desirable.

Current environment is NCR Century/251 with on-line fnancial software applications. IBM 370/145 DOS/VS, 360/30 DOS.

Salary commensurate wtih ability, education and experience. Send detailed resume including salary history and requirements in confidence to: CW Box 4640, 797 Washington St., Newton, Mass. 02160 *An Affirmative Action/ Equal Opportunity Employer.*

position announcements

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E. Coast banking client has immed need for expd Mgr, currently in similar position, to direct staff of approx 20. Should have degree & exp in large IBM systems. Will be resp. for 300K + budget & all systems development. Salary $23-$27K (fee paid). Contact Stan Durbas (in confidence).

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COBOL and PL-1 experience required. Starting salary $14-17M plus comprehensive benefits package. Send resume to Mr. Peter W. Turner, Personnel Department.

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PROGRAMMER ANALYST

Central Telephone & Utilities Corp., operating in 13 states has an immediate opening available in our Data Processing Department. Position calls for 2 to 3 years programming experience in COBOL language with IBM 360/370 DOS/OS Systems. Telephone background helpful.

This position represents a substantial and challenging opportunity for you to extend your professional career so why not grow along with us.

If you think you are the person we need, send your resume including education, history and salary requirements in complete confidence to:

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12 Industrial Road
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Submit resume including salary history and requirement to: Bruce Bertsch, Manager, Industrial Relations.

NCR **Special Systems Division**

4045 Sorrento Valley Blvd.
San Diego, Calif. 92121
An Equal Opportunity Employer

PROGRAMMER/ANALYST

R.J. Hansen Associates, Ltd., International Management and Information Systems Consultants, currently has career positions available in Edmonton, Alberta. Applicants must have a combination of two to three years experience in systems design and COBOL programming. Colllege preferred; on-line, telecommunications data base management experience highly desirable. Send resume to:

R.J. Hansen Associates, Ltd.
13910 Stony Plain Rd., Suite 1716
Edmonton, Alberta
(403) 452-0101

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ASSOCIATE DIRECTOR INFORMATION SYSTEMS

Incumbent will report to the Director of Information Systems and be in charge of the Instructional Support Group which coordinates and maintains applications programs in support of instructional curricula for the 19 campuses of the CSUC. Incumbent will direct the identification of deficiencies of computer oriented materials, establish minimum standards of computer support for degree programs, and develop and implement training of faculty and computer support personnel. Incumbent will consult with faculty and staff members on the feasibility of their requests for computer support. Incumbent will participate in developing and interpreting budget support plans to control agencies.

Qualifications: A master's degree, instructional classroom experience at the college level, five years of system design and development experience; a PhD is highly desirable. Project management capabilities essential and the ability to communicate effectively in writing and orally. Knowledge of innovative and state-of-the-art data processing technique and methodologies. Salary $25,580-$30,852. Resumes only, no phone calls please. Contact **Personnel Department, Ref. AD, The California State University and Colleges, Office of the Chancellor, 5670 Wilshire Blvd., Los Angeles, Calif. 90036.**

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PROGRAMMER

(COBOL)

R.J. Reynolds Industries, Inc. has an opening for a Data Processing Programmer. The position would report directly to a Systems Manager, RJRI Systems Department.

Applicants should possess the following

- Experience in COBOL language programming in the IBM 370/DOS/VS environment.
- Knowledge of the design, test, documentation, implementation, and maintenance of assigned programs.
- Familiarity with current available computer hardware and software technology.
- Undergraduate college degree preferable.

Excellent benefits package.

Send resume and salary requirements, in confidence, to.

Mr. Denis G. Simon
Corporate Employment Department
R.J. Reynolds Industries, Inc.
Winston-Salem, North Carolina 27102

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Please send your confidential resume to: RICHARD J. CALDER
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6486 Viscount Road Mississauga, Ontario L4V 1H3

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Senior Analyst to provide techical and analytical assistance in solution of systems problems. Reports to the Director MIS and requires degree and considerable significant experience in MRP and other production control systems. Extensive PICS or similar systems and in-depth knowledge of COBOL using a DOS/OS operating system. Attractive Compensation, benefits and growth potential. Send resume to:

Personnel Director
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A leading Mid-Western Gas Transmission company has an immediate opening for a systems analyst with 3 to 5 years experience in the Systems & Procedures Department. Applicants should have a degree in Computer Science or Mathematics, and have knowledge of Systems Analyst techniques, Programming, and IBM operating systems along with Cobol Programming language. Salary will be commensurate with your experience. Excellent benefits and growth potential. Reply in complete confidence along with salary history to:

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(412) 471 6103

Medical Center Director of Data Processing

Our client, a prestigious Southeastern University Medical Center, seeks a capable, experienced, highly motivated individual to direct its data processing activities. A minimum of five years experience in data processing with significant experience in a supervisory capacity is required. Experience in the health care field and master's degree are a plus. The successful candidate will be an energetic self starter who is seeking a challenging and rewarding career. All responses will be held in strictest confidence. Send resume and salary history to

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For further information on these and other positions, send resume in strict confidence to

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32 W. Randolph St
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(312) 346-9400

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Excellent fringe benefits, salary based on applicable experience.

Please send your resume, including detailed experience to

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$24,000 plus liberal fringe benefit. Please send resume, references will be requested. Reply: E.R. Krueger, OSSHE, Office of Educational Systems, P.O. Box 3175, Eugene, Oregon 97403. Applications accepted up to postmark date May 15, 1976. Equal Opportunity Employer

COBOL PROGRAMMERS

[illegible]

Software Manager

Continued expansion in software activity at our Process Control Division has produced a need for a highly competent individual to supervise group full time. This person must have come through the mill and be able to demonstrate the capability to lead a talented team of people in a demanding environment. The background should include heavy real-time, assembly language project work.

We offer comprehensive benefit program including a competitive starting salary. Interested applicants may send a resume with salary requirements to Mrs. Lisa Brown, LFE Corporation, 1601 Trapelo Road, Waltham, Mass. 02154. An equal opportunity employer.

LFE CORPORATION
Process Control Division

DIRECTOR OF SYSTEMS AND OPERATIONS

For Computer Network

The New Jersey Educational Computer Network (NJECN) is a cooperative organization [illegible] of higher education [illegible] academic and administrative [illegible] budget of approximately [illegible] Batch and [illegible] services are provided through [illegible] IBM 370 [illegible] and [illegible] hardware.

The Director of Systems and Operations [illegible] the Network Executive Director [illegible] programming, technical [illegible] Systems and Operations [illegible] Network [illegible] BS degree plus [illegible] experience [illegible] operations, with [illegible] managerial level [illegible] exhibit leadership [illegible] qualified in all areas of [illegible] $22-25,000, plus excellent benefits.

Offices of the corporation are located in [illegible] New Brunswick. Applications and resumes, [illegible] professional references, should be sent to

Dr. Joseph [illegible]
Executive Director
N.J. Educational Computer Network, Inc
P.O. Box [illegible]
New Brunswick, N.J. [illegible]

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[illegible]

APPLICATION PROGRAMMER

Cody, Wyoming

Husky Oil, an aggressive medium-sized company located in Wyoming at the foot of the Rockies, is currently seeking an Application Programmer, knowledgable on Honeywell 2000 equipment

The successful candidate would preferably have exposure to total data-base design and communication systems.

If you are a cobol programmer, and desirous of assuming responsibility, we would like to hear from you.

Send your resume in confidence to:

HUSKY

Mr. C.R. Schulz
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Husky Oil Company
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SCOTT

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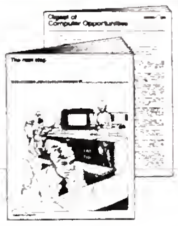

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East: Boston (617/237-3120), New York-New Jersey (201/687-8700), Philadelphia (215/665-1717).

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South & Southwest: Atlanta (404/634-5127), Dallas (214/638-4080), Houston (713/626-8705), New Orleans (504/523-2576).

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Cleveland, Ohio 44114
DALLAS
Data Processing Careers, Inc.
Suite 1109
Stemmons Tower West
Dallas, Texas 75207
DETROIT
Electronic Systems Personnel
1705 Fisher Building
Detroit, Michigan 48202
FLORIDA
Data Sciences Personnel, Inc.
Suite 205
15490 N.W. 7th Avenue
Miami, Florida 33169
HARTFORD
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900 Asylum Avenue
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801 Nicollet Mall, Suite 1716
Minneapolis, Minnesota 55402
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New York, New York 10017
PITTSBURGH
Electronic Systems Personnel
106 Lawyers Building
428 Forbes Avenue
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303 Sacramento Street
San Francisco, California 94111
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CFA Associates Personnel, Inc. (Agency)
2530 James Street
Syracuse, New York 13206
TULSA
Data Processing Careers, Inc.
Suite 10, Park 21 Building
2626 East 21st Street
Tulsa, Oklahoma 74114
WASHINGTON, D.C.
ESP Systems Corporation
Suite 210
1211 Connecticut Avenue N.W.
Washington, D.C. 20036

COMPUTING SERVICES POSITIONS

Southern Illinois University at Carbondale

Southern Illinois University at Carbondale is a state-supported comprehensive institution with a current enrollment of some 21,000 students. It offers a full range of undergraduate and graduate programs including law and medicine. Master's programs are available in 58 fields and the doctorate in 20 fields. Applicants for the following Computing Services positions are being sought:

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Duties involve supervising consulting and programming personnel (8 FTE) responsible for providing instructional and research computing services, acquisition of program products to serve academic needs, develop non-credit instruction support, complete short and long-term plans to meet changing academic computing support. The position reports to the Executive Director for Computing Affairs. A Ph.D. in Computer Science or related fields is required. Preferred experience includes 3 or more years experience in an academic computing environment, research grant or project experience, and familiarity with IBM 370 computers, virtual memory operating system and interactive computing, and prior teaching experience.

- **Director of Administrative Computing Services**

Duties include supervision of systems analysts and programmers for administrative support systems, identification of administrative systems priorities, development of schedules for design and implementation of systems, evaluation of systems requirements and costs, personnel training programs, liaison with administrative users and other duties assigned by the Executive Director. A Ph.D. in Administrative Sciences, Computer Sciences or related field and 3 or more years of management systems experience is desired. Experience required includes data base systems use and installation, previous supervisory experience, COBOL, or PL/1 programming experience and management systems analysis experience.

- **Director of Computer Operations**

Duties include supervision of IBM 370/158 machine operators, unit record machine operators, systems programmers, equipment maintenance personnel, production scheduling personnel and other operations personnel. Minimum requirements include IBM 370 computing equipment operations supervisory experience, a master's degree in Computer Science or related field and systems programming experience. Desired is experience with VM control program, OS/MVT, OS/VS1 or OS/VS2, RSCS, CICS or IMS.

- **Researcher, Academic Computing Services**

Duties include consultation with faculty and graduate students on research and instructional computing problems, teaching courses and seminars on use of computer systems and application programs, evaluation of computing requirements for research proposals, coordination of special programming projects, and other duties assigned by the Director of Academic Computing Services. The position requires a Ph.D. in Computer Science or related field. Previous academic computing experience desired.

Applications for the above positions should be sent to: Dr. Barry Bateman, Executive Director for Computing Affairs, Office of the President, Anthony Hall, Southern Illinois University at Carbondale, Carbondale, Illinois 62901. Applications should be received by May 21, 1976. *An Equal Opportunity Affirmative Action Employer*

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HARRIS CORPORATION Composition Systems Division
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PROGRAMMER ANALYST

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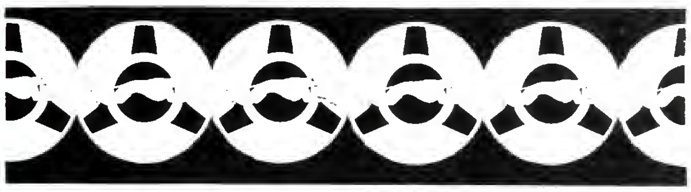

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(1) 370/145-KO2 (2001, 2150, 4660, 6982, 6983, 7855, 8100, 8810) with 3047, 3215
(1) 360/22 DC (4690)
(1) 3333-11 (8150, (2) 3330-11
(1) 3803-2 (1792, 9071)
(4) 3420-6 (6425)
(1) 3705-A1 (1301, 1302, 4701, 4714 (4), 4717, 4650, 1642, 1541)
(1) 2501-BO2
(2) 2821-2 (3615, 8637)
(1) 2821-1 (3615, 8637)
(3) 1403-N1 (8640)
(1) 2540
(1) 2701-1 (8029, 7697)

TERMS AND CONDITIONS

No bidder may withdraw, cancel or modify his bid for a period of 30 calendar days after the opening date thereof.

Equipment shall be sold to the highest bidder(s). Equipment will be available May 1, 1976. All equipment is eligible for IBM maintenance and is 208 Volt 3 phase. Serial numbers available upon request.

Owner will disconnect and prepare for shipment. Purchaser shall assume transportation and storage costs, if any.

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Final payment will be due within 30 days after notification of bid acceptance.

Late bids will be rejected.

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This new section of *Computerworld* classified display pages is here to provide a marketplace for computer systems that are designed to solve particular industry or application problems. We call them "turnkey systems" because they are usually combinations of hardware and software completely set up to perform specific processing tasks — e.g., hospital billing systems or retail inventory control. All you have to do is "turn the key" and you're in business.

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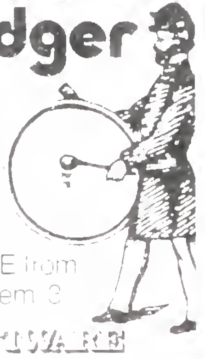

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Signature ____________ Date: ____________
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Send this form to: Pam Palmer, Classified Advertising, or Abby Purrington, Recruitment Advertising
COMPUTERWORLD, 797 Washington St., Newton, Mass. 02160

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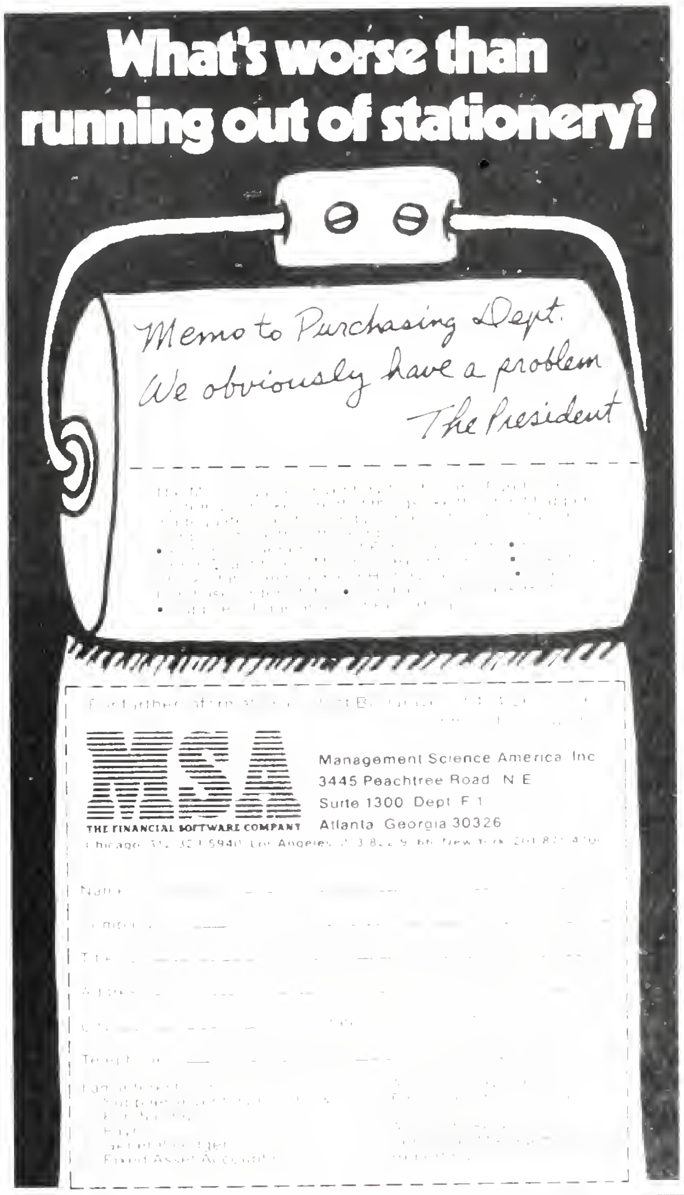

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Chicago [illegible] Los Angeles [illegible] New York [illegible]

Name

Tab Earnings on Wane in Nine Months

PALO ALTO, Calif. Tab Products Co.'s earnings declined in both the third quarter and nine months ended Feb. 29.

Earnings for the quarter were $246,000 or 29 cents a share compared with $279,000 or 33 cents a share in the same period a year ago.

Revenues were $9.3 million up slightly from the $9.2 million reported in the year-ago quarter.

For the nine months, earnings dropped to $694,000 or 83 cents a share compared with $1.1 million or $1.35 a share in the same period last year. Revenues fell slightly to $26.7 million compared with $27.2 million.

The 1975 results were restated to reflect a change to Lifo accounting for certain merchandise inventories and a change in computing depreciation for additions to rental or leased punch/verifiers, the firm said.

"While our data entry operation has not yet reached a profit position, revenues from this area have grown considerably," according to Tab's president, H.W. LeClaire.

"Excluding data entry revenues, sales of our filing systems products were $7.3 million during the quarter, down by about 5% from a year ago," he said.

"Primarily due to this continued depressed level of filing systems sales, profitability was comparatively lower in the third quarter," he added.

Tab has seen "positive signs that our business is on the upturn. During the third quarter, new orders for our filing systems were up by 6% from a year ago. . .Further, the new order rate for our data entry products has improved dramatically."

DPF Third-Quarter Earnings Leap, But Nine-Month Results Show Dip

HARTSDALE, N.Y. DPF, Inc.'s third-quarter earnings grew, but a large special credit in last year's nine-month results eclipsed gains in income before special credits for that period.

In the quarter, the leasing firm earned $1.1 million or 28 cents a share compared with $25,000 or 1 cent a share in the same period last year.

Special credits were $93,000 this year and $10,000 in the year-ago period.

Revenues rose to $6.4 million compared wtih $6 million in the same period last year.

During the nine months, the firm showed earnings of $1.6 million or 38 cents a share, including a $256,000 credit, compared with earnings of $4.6 million or $1.13 a share in the same period last year, when there was $4.4 million in special credits.

Revenues for the nine months were also off, to $17.4 million compared with $20 million a year ago.

Incoterm Reports Record Year Set

NATICK, Mass. Incoterm Corp.'s preliminary figures show the firm's revenues, earnings and backlog reached record levels for the year ended Feb. 29.

Earnings jumped to $2.5 million or $1.24 a share, including special credits of $276,000, compared with $325,000 or 12 cents a share last year, when there was a special credit of $175,000.

Revenues rose more than 52% to $32.7 million compared with $21.4 million last year.

The year-end backlog increased 60% to $24.7 million compared with $15.5 million a year ago.

During the final quarter, revenues rose 18% to nearly $8.8 million compared with $7.4 million.

Earnings for the three months failed to keep pace because of the difference in special credits. Earnings totaled $590,000 or 29 cents a share, including an $83,000 special credit, compared with $623,000 or 34 cents a share in the year-ago period, with a $175,000 special credit.

THE COMMONWEALTH
OF MASSACHUSETTS
EXECUTIVE OFFICE FOR
ADMINISTRATION AND FINANCE
STATE HOUSE
BOSTON, MASS. 02133

Notice of Public Hearing

Pursuant to the provisions of Massachusetts General Laws Chapter 29, Section 27B, as amended, and in accordance with the provisions of Massacusetts General Laws Chapter 30A, Section 3, as amended, a public hearing will be held by the Executive Office for Administration and Finance on Monday, May 10, 1976, at 10:00 A.M. in Room 2101, John W. McCormack Building, One Ashburton Place, Boston, Mass. 02108, relative to the adoption of PROCUREMENT PROCEDURES FOR DATA PROCESSING EQUIPMENT, DATA PROCESSING SERVICES, AND REPRODUCTION EQUIPMENT. A copy of the proposed procedures will be available at the Purchasing Agent's Division, John W. McCormack Building, One Ashburton Place, Boston, Mass. after April 1, 1976.

The Executive Office for Administration and Finance invites written comments and other proposals regarding these matters from interested parties. Those who intend to present written statements at the hearing will be afforded an early opportunity to testify at the hearing. The Executive Office for Administration and Finance will also hear any evidence concerning the proposed procurement procedures that will be presented at the hearing. Those wishing to respond in writing may do so by sending comments to the Bureau of Data Processing and Telecommunications, State House, Room 194, Boston, Mass. 02133.

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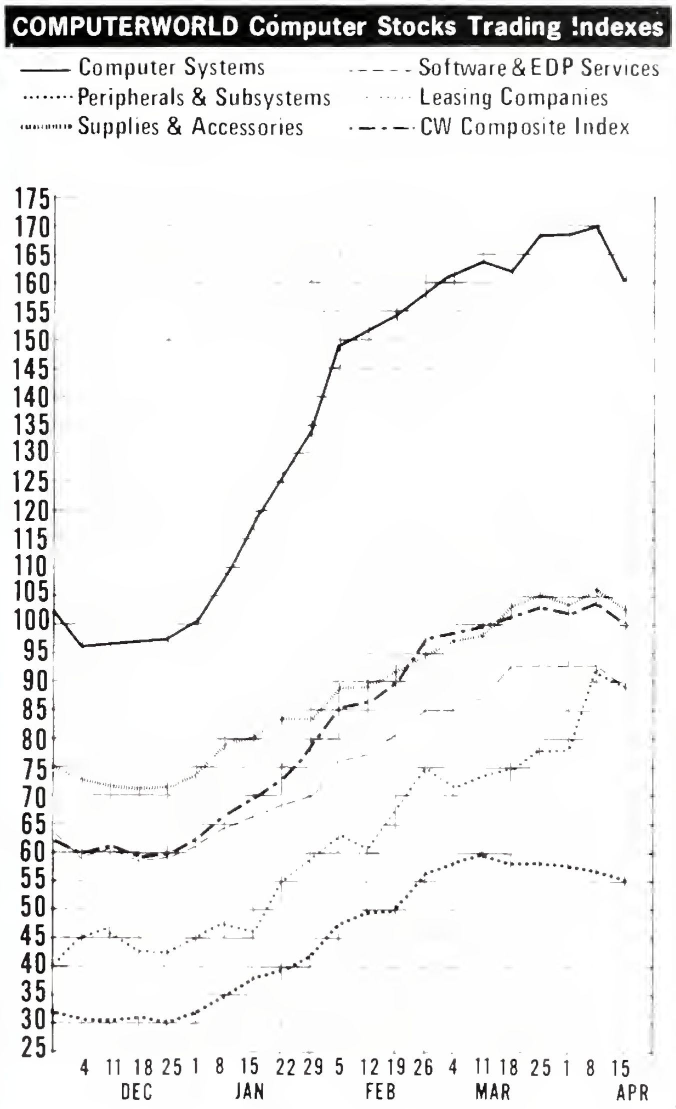
Earnings Reports



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Year Ended Jan. 31

	1976	1975
Shr Ernd	$.62	$.87
Revenue	120,109,000	131,085,000
Earnings	2,003,000	2,955,000
3 Mo Shr	.23	.15
Revenue	30,914,000	30,252,000
Earnings	746,000	493,000

BEEHIVE MEDICAL ELECTRONICS

Three Months Ended Dec. 31

	1975	1974
Shr Ernd	$.15	$.11
Revenue	2,514,790	2,123,507
Earnings	140,769	102,291

DATA DISC

Year Ended Jan. 2

	1976	1975
Shr Ernd	......	$.10
Revenue	$7,215,000	9,992,000
Earnings	(804,000)	103,000

ELECTRONIC ASSOCIATES

Year Ended Jan. 2

	1976	1975
Shr Ernd	$1.22	....
Revenue	33,572,000	$31,880,000
Disc Op	a679,000	b(12,003,000)
Spec Cred	d1,584,000	......
Earnings	3,266,000	(11,404,000)
3 Mo Shr	.42	.22
Revenue	10,769,000	9,494,000
Disc Op	(5,000)	180,000
Spec Cred	580,000	......
Earnings	1,138,000	587,000

a-After elimination of $1.35 million of excess prior-year loss provision, less applicable income tax effect of $672,000. b-Includes $10.02 million loss less tax effect of $493,000 from disposal of discontinued operations. d-Includes tax-loss carryforward of $1.5 million.

ITEL

Year Ended Dec. 31

	1975	1974
Shr Ernd	$1.25	$1.07
Revenue	204,000,000	143,500,000
Earnings	10,700,000	9,700,000

ANACOMP

Three Months Ended Dec. 31

	1975	1974
Shr Ernd	$.21	$.24
Revenue	2,930,227	1,667,766
Spec Cred	9,232	77,500
Earnings	195,761	177,024
6 Mo Shr	.43	.40
Revenue	5,913,291	3,318,325
Spec Cred	69,202	134,500
Earnings	405,980	302,330

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, APRIL 14, 1976

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass 02139

COMPUTER SYSTEMS

EXCH		PRICE 1975-76 RANGE (1)	CLOSE APR 14 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	62-109	103 1/8	-1 1/8	-1.0
O	COMPUTER AUTOMATION	2- 19	16	-2	-11.1
N	CONTROL DATA CORP	11- 27	23 1/4	-2 1/4	-8.8
N	DATA GENERAL CORP	10- 60	53 7/8	-4 3/8	-7.5
O	DATAPOINT CORP	6- 39	36	-2 1/4	-5.8
O	DIGITAL COMP CONTROL	1- 4	3	- 1/2	-14.2
N	DIGITAL EQUIPMENT	46-181	173 1/2	-3 1/4	-1.8
N	ELECTRONIC ASSOC.	2- 5	3 7/8	- 1/8	-3.1
A	ELECTRONIC ENGINEER.	5- 16	15 1/8	+ 1/8	+0.8
N	FOXBORO	23- 42	33 7/8	-3 1/4	-8.7
O	GENERAL AUTOMATION	4- 14	9 1/4	-1 1/8	-10.8
O	GRI COMPUTER CORP	1- 1	3/4	0	0.0
N	HEWLETT-PACKARD CO	58-120	112 7/8	-2	-1.7
N	HONEYWELL INC	22- 56	44 5/8	-3	-6.2
N	IBM	158-272	255 1/2	-13 1/2	-5.0
O	MANAGEMENT ASSIST	1- 3	2	- 7/8	-30.4
O	MEMOREX	1- 28	27 1/2	+2 1/2	+10.0
O	MICRODATA CORP	2- 26	22 1/4	-2 1/4	-9.1
O	MODULAR COMPUTER SYS	5- 19	9 1/2	- 3/4	-7.3
N	NCR	15- 39	26 1/8	- 3/4	-2.7
O	PRIME COMPUTER INC	2- 11	9 3/4	- 1/2	-4.8
N	PERKIN-ELMER	16- 30	23 7/8	-2 1/4	-8.6
N	RAYTHEON CO	26- 59	50 1/2	-3	-5.6
N	SPERRY RAND	26- 50	46 7/8	-1 1/2	-3.1
O	SYCOR INC	5- 31	26 3/4	- 3/4	-2.7
A	SYSTEMS ENG. LABS	1- 10	9	+ 3/4	+9.0
N	VARIAN ASSOCIATES	7- 18	14 5/8	+ 1/8	+0.8
A	WANG LABS.	7- 20	13 5/8	-4 5/8	-25.3

LEASING COMPANIES

EXCH		PRICE 1975-76 RANGE (1)	CLOSE APR 14 1976	WEEK NET CHNGE	WEEK PCT CHNGE
C	COMDISCO INC	1- 10	8 3/8	- 1/8	-1.4
A	COMMERCE GROUP CORP	2- 4	2 3/8	- 3/4	-24.0
A	COMPUTER INVSTRS GRP	1- 3	2	- 1/8	-5.8
M	DATRONIC RENTAL	1- 1	5/8	0	0.0
A	DCL INC	0- 1	3/4	0	0.0
N	DPF INC	3- 7	6	0	0.0
O	EDP RESOURCES	1- 2	1	0	0.0
A	GREYHOUND COMPUTER	2- 5	4 1/2	0	0.0
N	ITEL	3- 13	12 1/2	0	0.0
N	LEASCO CORP	4- 14	12	- 3/4	-5.8
O	LEASPAC CORP	0- 1	1/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
C	NPG INC	0- 4	7/8	- 1/8	-12.5
A	PIONEER TEX CORP	2- 9	7 3/8	- 1/8	-1.6
A	ROCKWOOD COMPUTER	1- 1	1/8	0	0.0
N	U.S. LEASING	7- 14	10 5/8	0	0.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1975-76 RANGE (1)	CLOSE APR 14 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 1	7/8	+ 1/8	+16.6
A	APPLIED DATA RES.	1- 10	2 1/4	- 3/8	-14.2
N	AUTOMATIC DATA PROC	29- 65	60 3/4	-2 3/4	-4.3
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	COLEMAN AMERICAN COS	4- 6	4 1/8	0	0.0
O	COMPUTER DIMENSIONS	2- 7	6 3/4	+ 3/8	+5.8
C	COMP ELECTION SYSTMS	3- 7	5 3/4	0	0.0
C	COMPUTER HORIZONS	1- 1	1 3/4	0	0.0
C	COMPUTER NETWORK	1- 6	5 1/2	- 1/4	-4.3
N	COMPUTER SCIENCES	2- 8	6 1/2	- 3/8	-5.4
O	COMPUTER TASK GROUP	1- 1	1	- 1/8	-11.1
C	COMPUTER USAGE	2- 6	3 3/4	- 3/4	-16.6
O	COMSHARE	2- 4	3 3/4	+ 1/8	+3.4
O	DATATAB	1- 2	7/8	- 1/8	-12.5
A	ELECT COMP PROG	1- 1	1/8	0	0.0
N	ELECTRONIC DATA SYS.	11- 28	12 5/8	- 1/8	-0.9
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 1	1 1/8	- 1/8	-10.0
O	KEANE ASSOCIATES	2- 3	3 1/8	0	0.0
C	KEYDATA CORP	2- 5	2 7/8	- 3/8	-11.5
C	LOGICON	3- 5	4	0	0.0
A	MANAGEMENT DATA	1- 3	2 3/8	- 1/4	-9.5
A	NATIONAL CSS INC	6- 25	19 5/8	-2	-9.2
O	NATIONAL COMPUTER CC	1- 1	1/8	0	0.0
A	ON LINE SYSTEMS INC	8- 22	18	-1 7/8	-9.4
N	PLANNING RESEARCH	2- 6	3 1/4	- 1/2	-13.3
C	PROGRAMMING & SYS	1- 1	1/2	0	0.0
C	RAPIDATA INC	2- 5	3 1/4	- 3/8	-10.3
O	REYNOLDS & REYNOLD	10- 24	17	- 1/2	-2.8
O	SCIENTIFIC COMPUTERS	1- 1	3/4	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1	0	0.0
O	TYMSHARE INC	7- 28	22 1/2	-2 3/8	-9.5
A	URS SYSTEMS	2- 5	3 1/2	- 1/2	-12.5
N	WYLY CORP	2- 7	4 1/2	- 1/4	-5.2

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1975-76 RANGE (1)	CLOSE APR 14 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	4- 13	9 3/8	- 7/8	-8.5
O	ADVANCED MEMORY SYS	1- 10	8 1/4	- 1/2	-5.7
N	AMPEX CORP	3- 8	6 7/8	- 5/8	-8.3
O	ANDERSON JACOBSON	1- 4	2 3/4	- 1/8	-4.3
O	BEEHIVE MEDICAL ELEC	1- 6	4 3/4	- 3/8	-7.3
A	BOLT,BERANEK & NEW	5- 13	7 7/8	- 1/4	-3.0
N	BUNKER-RAMO	4- 8	5 5/8	- 1/2	-8.1
A	CALCOMP	3- 7	5 1/8	- 3/8	-6.8
O	CAMBRIDGE MEMORIES	1- 6	4 1/2	- 3/4	-14.2
N	CENTRONICS DATA COMP	7- 35	31	- 3/8	-1.1
O	CODEX CORP	15- 42	36	-1	-2.7
O	COGNITRONICS	1- 2	1 1/4	+ 1/8	+11.1
C	COMPUTER COMMUN.	1- 4	4 1/2	+ 1/4	+5.8
O	COMPUTER CONSOLES	3- 7	5 3/4	0	0.0
A	COMPUTER EQUIPMENT	1- 3	2	- 1/8	-5.8
O	COMPUTER MACHINERY	1- 2	2	0	0.0
O	COMPUTER TRANSCEIVER	0- 0	1 1/2	0	0.0
O	COMTEN	2- 9	7 3/4	0	0.0
N	CONRAC CORP	12- 30	22	-1 1/4	-5.3
O	DATA ACCESS SYSTEMS	1- 3	2 1/4	+ 1/4	[illegible]
O	DATA 100	5- 16	11	-1 [illegible]	[illegible]
A	DATA PRODUCTS CORP	2- 11	10 3/8	+ 1/4	[illegible]
O	DATA TECHNOLOGY	1- 3	[illegible]	[illegible]	0.0
O	DATUM INC	1- 2	2 1/4		[illegible]
O	DECISION DATA COMPUT	2- 7	1 7/8	- 5/8	[illegible]
O	DELTA DATA SYSTEMS	1- 1	3/4		[illegible]
C	DIZAN CONTROLS	1- 1	1	[illegible]	0.0
N	ELECTRONIC M & M	1- 3	2 5/8	- 1/4	-8.6
O	FABRI-TEK	1- 1	1	[illegible]	0.0
O	GENERAL COMPUTER SY	1- 2	1 1/4	+ 1/4	[illegible]
N	HAZELTINE CORP	3- 12	5 1/4	-1 [illegible]/4	[illegible]
N	HARRIS CORP	18- 47	42 [illegible]/8	-1 1/4	[illegible]
A	INCOTERM CORP	3- 22	14 1/2	-[illegible] 1/4	-13.4
O	INFOREX INC	2- 7	5 3/8	[illegible]/4	[illegible]
O	INFORMATION INTL INC	8- 16	14	-1 3/4	-11.1
O	INTEL CORP	21-109	101 1/2	+1	[illegible]
A	LUNDY ELECTRONICS	4- 7	4 3/4	- 1/4	[illegible]
O	MSI DATA CORP	3- 10	6 1/4	[illegible] 1/2	-7.4
A	MILGO ELECTRONICS	9- 24	16	- 1/4	-1.5
N	MOHAWK DATA SCI	1- 7	[illegible]	3/8	[illegible]
C	OPTICAL SCANNING	1- [illegible]	3/8	[illegible]	0.0
C	PENRIL CORP	[illegible]	2 3/4	0	[illegible]
A	PERTEC CORP	[illegible]	[illegible] 3/8	5/8	[illegible]
A	POTTER INSTRUMENT	[illegible]	[illegible]	0	0.0
O	PRECISION INST.	[illegible]	[illegible]	+[illegible]	[illegible]
O	QUANTOR CORP	2- [illegible]	4 [illegible]	0	0.0
O	RECOGNITION EQUIP	2- 11	[illegible]	[illegible]	7.4
N	SANDERS ASSOCIATES	[illegible]	[illegible]	-1	-9.5
O	SCAN DATA	1- [illegible]	[illegible]	+ 1/4	[illegible]
O	STORAGE TECHNOLOGY	[illegible]	[illegible]	- 1/8	-1.1
O	T BAR INC	[illegible]	[illegible]	[illegible]	[illegible]
O	TALLY CORP.	[illegible]	[illegible]	- 1/4	[illegible]
O	TEC INC	[illegible]	[illegible]	[illegible]	[illegible]
N	TEKTRONIX INC	[illegible]	[illegible]	+ 1/8	[illegible]
N	TELEX	[illegible]	[illegible]	[illegible]	[illegible]
O	WANGCO INC	[illegible]	[illegible]	[illegible]	[illegible]
O	WILTEK INC	[illegible]	[illegible]	[illegible]	[illegible]

SUPPLIES & ACCESSORIES

EXCH		PRICE 1975-76 RANGE (1)	CLOSE APR 14 1976	WEEK NET CHNGE	WEEK PCT CHNGE
[illegible]	[illegible]	1- 4	[illegible] 1/2	+ [illegible]	+3.7
O	BALTIMORE BUS FORMS	4- 5	4 1/[illegible]	[illegible]	[illegible]
A	BARRY WRIGHT	[illegible] 10	8 1/2	- 3/[illegible]	[illegible]
O	CYBERMATICS INC	0- 1	5/8	1/8	-16.6
A	DATA DOCUMENTS	29- [illegible]	36 3/4	- 1/[illegible]	[illegible]
O	DUPLEX PRODUCTS INC	12- [illegible]	1[illegible] 1/2	[illegible]	7.5
N	ENNIS BUS. FORMS	[illegible]	6 1/4	- [illegible]	[illegible]
O	GRAHAM MAGNETICS	5- 13	1[illegible] 3/4	1/4	[illegible]
O	GRAPHIC CONTROLS	8- 21	1[illegible] 1/4	-1	[illegible]
N	3M COMPANY	[illegible]	[illegible] 1/4	-1	[illegible]
O	MOORE CORP LTD	39- 51	48	1	[illegible]
N	NASHUA CORP	9- 22	1[illegible] 5/8	- 7/8	-6.0
O	STANDARD REGISTER	11- 20	17 1/4	[illegible]	0.0
O	TAB PRODUCTS CO	4- 8	[illegible] 1/2	0	0.0
N	UARCO	17- 25	24 1/2	- 1/2	[illegible]
O	VANIER GRAPHICS CORP	4- 8	7 1/4	- 1/8	-1.6
A	WABASH MAGNETICS	3- 8	7	- 1/8	-1.7
N	WALLACE BUS FORMS	15- 25	22 1/8	- 3/8	-1.6

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